United States
Department of
Agriculture

Forest
Service

March 2015

Draft Environmental Impact Statement

Westside Fire Recovery Project

Happy Camp Oak Knoll and Salmon/Scott River Ranger Districts,
Klamath National Forest
Siskiyou County, California

Township (T) 39 North (N) Range (R) 10 West (W) Sections (S) 1-11, 17, 18; T39N R11W, S 1-3 , 10-15; T40N R9W, S 6-7, 18, 30; T40N R10W S 1-36; T40N R11W S 1-4, 9-16, 21-28, 33-36); T41N R10W S 18 -22 , 27-35; T41N R11W S24-25, 33-36;T43N R12W S 2-11, 14-20; T44N R10W S 6; T44N R11W S1-11,15-22, 28-30;T44N R12W S1-36; T45N R10W S5-9, 16-21, 28-32; T45N R11W S1-36; T45N R12W S 1-36; T46N R10W S 1-3, 10-15, 31-32; T46N R11W S 16-22, 26-36; T46N R12W S10-11,13-17, 20-36; T46N R8W S 2-7, 9-11; T46N 9W S 1-14, 18; T47N R8W S 4-10, 15-22, 27-34; T47N R9W S 1, 9-17, 19-36); T47 N10W S 25,34-36, Mount Diablo Meridian.

T14N R8E S 5, 8, 17, 20; T15N R7E S 1, 2, 12, 13, 24; T15N R8E S3-10,15-22, 27-28, 34; T16N R7E S 1, 2, 10-15, 23-25, 35-36; T16N R8E S6-10,15-22, 27-34, Humboldt Meridian.

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Westside Fire Recovery Project

Draft Environmental Impact Statement

Siskiyou County, California

Lead Agency:	**USDA Forest Service**
Responsible Official:	**Patricia A. Grantham, Forest Supervisor** **Klamath National Forest** 1711 South Main Street, Yreka, CA, 96097
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Abstract: The Westside Fire Recovery Project was developed in response to the 2014 wildfires on the Happy Camp/Oak Knoll and Salmon/Scott River Ranger Districts of the Klamath National Forest (Forest). The project will address the needs for 1) worker and public safety and access; 2) safe conditions for firefighters performing fire suppression for community protection; 3) a project that is economically viable, meeting project objectives and benefiting our local communities; and 4) restored and fire-resilient forested ecosystems. Alternatives considered in detail are: (1) Alternative 1, no action; (2) Alternative 2, the refined proposed action (preferred alternative); (3) Alternative 3, an alternative that emphasizes the development of future late successional forest habitat, habitat connectivity, northern spotted owl habitat and legacy components within the post fire landscape; (4) Alternative 4, an alternative that is designed to reduce watershed disturbance and impacts to water quality and fisheries, relative to the proposed action; and, (5) Alternative 5, that adds fuels treatments adjacent to private timber lands and removes treatment of salvage logging and site preparation from late successional reserves, riparian reserves, and inventoried roadless areas.

Reviewers should provide the Forest Service with their comments during the review period of the draft environmental impact statement. This will enable the Forest Service to analyze and respond to the comments at one time and to use information acquired in the preparation of the final environmental impact statement, thus avoiding undue delay in the decision-making process. Reviewers have an obligation to structure their participation in the National Environmental Policy Act process so that it is meaningful and alerts the agency to the reviewers' position and contentions. *Vermont Yankee Nuclear Power Corp. v. NRDC,* 435 U.S. 519, 553 (1978). Environmental objections that could have been raised at the draft stage may be waived if not raised until after completion of the final environmental impact statement. *City of Angoon v. Hodel* (9th Circuit, l986) and *Wisconsin Heritages, Inc. v. Harris,* 490 F. Supp. 1334, 1338 (E.D. Wis. 1980). Comments on the draft environmental impact statement should be specific and should address the adequacy of the statement and the merits of the alternatives discussed (40 CFR 1503.3). In order for a reference to be considered, commenters are required to supply all referenced literature and discuss its relevancy to the project and its effects as part of their comments. The opportunity to comment will end 30 days following publication of the notice of availability (NOA) in the Federal Register, as published. Publication of the NOA in the Federal Register is anticipated on March 13, 2015 and is the sole means of calculating the comment period. The acceptable format(s) for electronic comments include: plain text (.txt), rich text format (.rtf), Word (.doc, .docx), or portable document format (.pdf). Submit comments at: http://www.fs.fed.us/nepa/nepa_project_exp.php?project=45579. Or, send hard-copy comments to: Patricia A. Grantham, ATTN: Wendy Coats, fax (530) 842-6131 or mailed to 1711 S. Main Street, Yreka, CA 96097, or hand-delivered during normal business hours (8am to 4:30 pm Monday-Friday, excluding holidays). For oral comments contact Wendy Coats at (530) 841-4470.

Summary

The Forest Service prepared this draft environmental impact statement (EIS) in compliance with the National Environmental Policy Act (NEPA) and other relevant federal and state laws and regulations. In response to issues raised by the public during scoping and consultation efforts with tribes and regulatory agencies, the Forest Service refined the proposed action and developed three additional action alternatives analyzed in detail. This EIS discloses the environmental impacts that would result from the proposed action or its alternatives.

Background

Severe drought and exceptionally dry fuel conditions made the 2014 fire season one of the most impacting in the history of the Klamath National Forest. Fires within the Happy Camp Complex were ignited by lightning near the town of Happy Camp, which is located on the middle portion of the Klamath River. Hot, dry and windy conditions caused three of the original 19 fires to escape containment, burn actively for several weeks, and eventually grow together and spread south along the Scott River and into the Marble Mountain Wilderness. The Beaver Fire occurred on the north side of the Klamath River about 30 miles east of Happy Camp, and eventually consumed approximately 32,400 acres. The July Complex was comprised of the Log and Whites Fires, which burned approximately 37,000 acres southeast of Fort Jones. The July Complex burned both private and Forest Service land, ultimately spreading into the Marble Mountain Wilderness and into the drainage of the North Fork of the Salmon River. The 2014 fire season ultimately burned about 215,000 acres on the Forest, of which the Beaver Fire, the Happy Camp Complex, and the Whites Fire of the July Complex are a subset[1]. The Beaver Fire, Happy Camp Complex, and Whites Fire burned a total of 183,100 acres, including 162,300 acres of National Forest System lands and 20,800 acres of private land (table S-1 below).

Table S- 1: Acres of burned Forest Service and private lands within the proposed project area

Project Area	Fire	Fire Start Date	Containment Date	Acres Burned: Forest Service	Acres Burned: Private	Total Acres Burned
A	Beaver Fire	July 30, 2014	August 30, 2014	14,600	17,800	32,400
B	Happy Camp Complex	August 12, 2014	October 29, 2014	114,800	2,100	116,900
C	Whites Fire	July 31, 2014	September 25, 2014	32,900	900	33,800
Total of All Fires (acres)				162,300	20,800	183,100

[1] The Beaver Fire, Happy Camp Complex, and Whites Fire were identified as requiring critical treatments due to post-fire conditions. Some other fires were also entirely within wilderness, preventing treatment. On the Goosenest Ranger District on the east side of the Klamath National Forest, the Forest has proposed the Little Deer project, which has much different conditions and no significant effects; the Environmental Assessment has moved forward without an Emergency Situation Determination request and an objection filing period that begins in late February 2015.

Burned Area Emergency Response

Burned Area Emergency Response (BAER) actions, currently underway, aim to identify and manage imminent and unacceptable threats to human life, safety, property, and critical natural and cultural resources on National Forest System lands. BAER actions include repairing road drainages (grading, culvert cleaning, installation of rolling drainage dips, etc.), felling only imminent hazard trees along 650 miles of roads, and posting closure signs along roads and trails. Hazard trees felled during fire suppression and BAER activities were very limited in scope compared to the fire event and consisted of the most high-priority danger tree hazards[2] along only the most frequented of roadways. Due to the objectives of BAER activities and the scale of the event, the many recently fire-killed trees were considered to be structurally sound at the time and were left standing. As snags along the roadways in burned areas are exposed to winter rains, snow, and winds and subsequently deteriorate and decay, threats to human health and safety substantially increase. While BAER activities mitigate many of the immediate hazards, additional emergency actions are needed to address the remaining safety concerns and to move the affected areas towards recovery.

Purpose and Need

The Westside Fire Recovery project was developed in response to landscape-level changes to forested habitat resulting from the 2014 wildfires on the Klamath National Forest. Forest Service resource specialists began evaluating conditions in the project area immediately following the fires. The BAER analyses provided resource assessments on the fires' effects on soils, watersheds, vegetation, and wildlife. Post-fire inventories of the transportation system were conducted to obtain condition status. Field crews conducted surveys on forested stands to collect data on stand mortality and salvage viability. Soil burn severities and vegetation burn severities were mapped to determine the changed post-fire conditions. The initial post-fire assessments were completed by the fall of 2014. Resource specialists used this information to make recommendations to the responsible official, Forest Supervisor Patricia Grantham, for developing the proposed action.

The purpose and need of the project is to address the following:

- There is a need for worker and public safety and access.
- There is a need for safe conditions for firefighters performing fire suppression for community protection.
- There is a need for a project that is economically viable, meeting project objectives and benefiting our local communities.
- There is a need for restored and fire-resilient forested ecosystems.

See chapter 1 for the detailed purpose and need.

Proposed Action

The project area comprises 218,600 total acres, including 187,100 acres of National Forest System land and 31,500 acres of private land. It is divided into three subparts:

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[2] A high-priority danger tree hazard is defined as "a road or road segments where danger trees are determined to be highly likely to fail and where those failures would be highly likely to cause injuries" (FSH7709.59 Section 40.5).

project area A (Beaver Fire), project area B (Happy Camp Complex), and project area C (Whites Fire of the July Complex). The boundary was expanded beyond the fire perimeters near private property structures in order to incorporate hazardous fuel reduction treatments and fire breaks for community protection. See the vicinity map in appendix A.

In order to accomplish these objectives, the Forest Service proposes:

- 11,700 acres of salvage harvest units[3] where fire-killed trees (snags) would be removed to reduce future fire risk and severity and to provide for public and forest worker safety;
- 650 miles of roadside hazard treatments (i.e., snag removal) along Forest system roads, state highways, and county roadways;
- 22,900 acres of hazardous fuels treatments (including strategic fuel breaks and treatments within ¼ mile of private property structures and other infrastructure); and
- 7,900 acres of reforestation (site preparation, planting, and release) to accelerate the restoration of forest habitat.

Public Engagement

The Notice of Intent to prepare an EIS for the Westside Fire Recovery project was published in the Federal Register on October 15, 2014, beginning the 30-day public scoping period. The Forest is using news releases and social media to inform broader audiences. The Forest has created a project website[4] to provide an independent electronic news outlet, as well as the standard legal notices and public notifications to meet the requirements of the NEPA. Field trips and public open house meetings in the local communities of Yreka, Fort Jones, Scott Bar, Sawyers Bar, Happy Camp, Klamath River, and Seiad have occurred and will continue to be used to inform, consult, and involve interested parties in an interactive, in-person manner. These efforts will also help us gauge public understanding and perception of the project. The Forest Service has also met with representatives of the timber industry regarding this project in order to gauge industry interest and capacity for salvage harvest using commercial timber sales.

Beyond the Forest's typical means of outreach, the Westside Fire Recovery project has also inspired the creation of two local collaborative groups:

- On January 6, 2015, the Siskiyou County Board of Supervisors unanimously approved the formation of a Citizens' Advisory Committee, charged with developing consensus recommendations for the Board to consider in responding to federal and state agencies on a variety of topics, including the Westside Fire Recovery project. An objective of the Board is to have the committee represent a broad spectrum of interests within Siskiyou County.

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[3] Treatment in salvage harvest units is limited to moderate to high severity areas (>50% mortality) outside of riparian reserves. An estimated 6,800 acres of fire-killed trees would actually be removed. See chapter 2 for a complete description of harvest units.

[4] http://www.fs.fed.us/nepa/nepa_project_exp.php?project=45579

- The locally-based National Institute for the Elimination of Catastrophic Wildfire is forming a diverse citizens' collaborative group to address the Westside Fire Recovery project. The group ("The Westside Klamath Steering Committee") will be comprised of Siskiyou County residents representing a wide range of interests who reflect the social and economic diversity within the affected area. The purpose of the group is to generate, through a collaborative process, consensus recommendations to the Forest Service, Siskiyou County Board of Supervisors, the California State Legislature, the Governor's Office, and the California Congressional Delegation regarding treatments for the Westside Fire Recovery project.

The two groups are not expected to compete with one another, but, rather, to complement each other in representing the views of Siskiyou County residents. It is anticipated that both collaborative groups will:

- serve as advocates for actions regarding the recovery and restoration of the Westside Fire Recovery project area that are reflective of, and responsive to, the needs of the residents of Siskiyou County;
- help evaluate the draft EIS; and
- suggest guidance for finding balance between protecting resources (such as wildlife, fisheries, and water quality) and protecting human life and safety, public infrastructure, private property, and communities.

The Forest has been actively consulting with regulatory agencies as well as local and national elected officials. The Forest has also initiated government to government consultation with federally recognized local tribes. The Karuk Tribe has raised specific concerns regarding reforestation actions and project timelines; the Forest is increasing its engagement with the Karuk to address these concerns. The Forest is developing a project-specific programmatic agreement with the State Historic Preservation Office for compliance with the National Historic Preservation Act. Regarding the Endangered Species Act (ESA), the Forest is consulting and conferencing with the U.S. Fish and Wildlife Service about the effects of the project on the ESA-listed northern spotted owl and ESA listing candidate Pacific fisher, respectively. The Forest is also consulting with National Oceanic and Atmospheric Administration, National Marine Fisheries Service (NOAA Fisheries or NFMS) about the effects of the project on the ESA-listed Coho Salmon. The Forest is also working up-front with the North Coast Regional Water Quality Control Board regarding compliance with the Clean Water Act. The Forest will continue consultation efforts with all parties to ensure there is a full understanding of the project and that the resource needs of these groups are recognized and addressed.

Results of Scoping

The Forest Service received 749 unique comments by means of 98 unique letters, and 1,556 form letters during the scoping period. In response to comments received, the Forest Service determined four issues to be relevant to alternative development. Other issues were also considered during the refinement of the proposed action (chapter 2) or addressed in the disposition of scoping comments (appendix B).

Four issues were determined to be relevant to alternative development:

1. There is a disagreement about effects of salvage logging on wildlife habitat (e.g. northern spotted owl, Pacific fisher, and snag-associated species) and general wildlife habitat fragmentation and connectivity. (Alternative 3 responds to this issue.)
2. There is a disagreement about the effects of salvage logging and required infrastructure on watershed health (e.g. beneficial uses, Coho Salmon habitat, and soil productivity). (Alternative 4 responds to this issue.)
3. There is a disagreement about the effects of salvage logging, site preparation, and planting on late successional reserves and riparian reserves. (Alternatives 3, 4, and 5 respond to this issue.)
4. There is a disagreement about whether or not the proposed action sufficiently reduces fuels adjacent to private timber lands in the Beaver Fire area. (Alternative 5 responds to this issue.)

These issues led the agency to develop alternatives to the proposed action summarized below.

Alternatives Considered in Detail

In response to relevant issues, the Forest Service developed three alternatives to the proposed action and several alternatives considered but eliminated from detailed study. These are described in detail in chapter 2.

- *Alternative 1 (No Action)* -There will be no treatment with this alternative. The no action alternative provides reviewers a baseline to compare the magnitude of environmental effects of the action alternatives. It also provides a picture of the results of allowing natural regeneration to take place across the project area.
- *Alternative 2 (Refined Proposed Action)* – This alternative is the proposed action as scoped, except refined in response to public scoping comments and the acquisition of field-verified information about the project area. See above for a brief description or chapter 2 for details.
- *Alternative 3* – This alternative was developed in response to relevant issues about the effects of the proposed action on spotted owl and fisher habitat, habitat connectivity, and legacy components (i.e. old growth trees) and concerns about treatments in late-successional reserves. Alternative 3 emphasizes the development of future late successional habitat, habitat connectivity, northern spotted owl habitat and legacy habitat components within the post fire landscape. Alternative 3 is designed to retain legacy components for future habitat development, reduce effects to northern spotted owl nests, and lessen the effects to connectivity while still meeting the purpose and need for action.
- *Alternative 4* – This alternative was developed to reduced impacts to watershed, including to federally-listed Coho Salmon. This alternative was developed through consultation discussions between the Forest Service and NMFS and in response to relevant public issues about the effects of the proposed action on watershed conditions and recovery. Alternative 4 is designed to reduce watershed disturbance and impacts to water quality and fisheries, relative to the proposed action, while still meeting the purpose and need for action. This alternative takes a more conservative approach to implementing the Forest Plan's Aquatic Conservation Strategy by reducing or eliminating temporary road actions, especially within key watersheds and sensitive watersheds, as identified by the interdisciplinary team.

- *Alternative 5* – This alternative addresses disagreements about the effects of salvage logging and site preparation on late successional reserves, riparian reserves, and inventoried roadless areas. Alternative 5 also addresses disagreements about whether or not the proposed action sufficiently addresses the needs for fuels reduction adjacent to private timber lands in the Beaver Fire area. Salvage harvest, site preparation, planting, and release are only proposed within management areas considered as matrix lands. Additional hazardous fuels treatments are proposed adjoining private land treatments to increase fuel breaks along ridge and road systems within the Beaver Fire area.

In addition to the 14 alternatives developed, the Forest Service received an alternative from the Karuk Tribe on March 5, 2015 at 4:30 pm, the day before printing; it has been incorporated into appendix G of the DEIS and is available for public review and comment. For the final EIS and for consideration in the decision, the Forest Service may likely produce another alternative to be analyzed in detailed study. This alternative would be reflective of ideas raised during the public comment period, collaborative efforts, and consultation. It would be comprised of actions already proposed among the existing action alternatives. Actions would be within the range of alternatives already proposed and their effects would be within the scope of analysis already considered in this draft EIS.

Emergency Situation Determination

In order to facilitate implementation of the project, the Forest is seeking an Emergency Situation Determination pursuant to 36 CFR 218.21. Under 36 CFR 218.21(d), a proposed action is not subject to the pre-decisional objection process if the Chief or Associate Chief of the Forest Service determines that an emergency situation exists with respect to all or part of the proposed action or activity. 36 CFR 218.21(b) defines an emergency situation as:

> *a situation on National Forest System (NFS) lands for which immediate implementation of a decision is necessary to achieve one or more of the following: relief from hazards threatening human health and safety; mitigation of threats to natural resources on NFS or adjacent lands; avoiding a loss of commodity value sufficient to jeopardize the agency's ability to accomplish project objectives directly related to resource protection or restoration.*

If the Emergency Situation Determination is granted, it would mean that there would be no provision for administrative challenge (objection) prior to issuance of a Record of Decision.

Alternative Arrangements

In order to facilitate implementation of this project, the Forest Service requested alternative arrangements with the Council on Environmental Quality pursuant to 40 CFR 1506.11, which states:

> Where emergency circumstances make it necessary to take an action with significant environmental impact without observing the provisions of these regulations, the Federal agency taking the action should consult with the Council about alternative arrangements.

The Forest Service received alternative arrangements that shortened the 45-day comment period requirement for the draft EIS by 15 days, resulting in a 30-day comment period (40 CFR 1506.10(c)).

The Forest Service is also requesting alternative arrangements with the Council on Environmental Quality to:

- Eliminate the 90-day requirement between the notice of availability of the draft EIS and the Record of Decision (1506.10(b)(1)) and
- Eliminate the 30-day wait period between the final EIS and the Record of Decision (40 CFR 1506.10(b)(2)).

Decision Framework

As the Responsible Official, the Forest Supervisor may decide to: (1) select the proposed action; (2) select one of the alternatives; (3) select one of the alternatives after modifying the alternative with additional mitigating measures or a combination of activities from other alternatives; or, (4) select the no action alternative, choosing not to authorize the Westside Fire Recovery project. In making this decision, the Forest Supervisor will consider such questions as:

- How well does the selected alternative meet the purpose and need described in this EIS?
- How well does the selected alternative move the project area toward the desired conditions established in the Forest Plan?
- Does the selected alternative mitigate potential adverse effects?

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Chapter 1 Purpose of and Need for Action

Document Structure

The Forest Service has prepared this Environmental Impact Statement (EIS) in compliance with the National Environmental Policy Act (NEPA) and other relevant federal and state laws and regulations. This EIS discloses the direct, indirect, and cumulative environmental impacts that would result from the proposed action and alternatives. The document is organized into four chapters and eight appendices:

- *Purpose of and Need for Action (Chapter 1)*: This chapter briefly describes the proposed action, the need for that action, and other purposes to be achieved by the proposal. This section also details how the Forest Service informed the public of the proposed action and how the public responded.
- *Alternatives, Including the Refined Proposed Action (Chapter 2):* This chapter provides a detailed description of the agency's proposed action as well as alternative actions that were developed in response to comments raised by the public during scoping. The end of the chapter includes a summary table comparing the proposed action and alternatives with respect to their environmental impacts.
- *Affected Environment and Environmental Consequences (Chapter 3):* This chapter describes the environmental impacts of the proposed action and alternatives.
- *Consultation and Coordination (Chapter 4):* This chapter provides a list of preparers and agencies consulted during the development of the draft EIS.
- *Appendices:* The appendices provide more detailed information to support the analyses presented in the draft EIS.

The draft EIS and supporting documents can be found at: http://www.fs.fed.us/nepa/nepa_project_exp.php?project=45579 .

Additional information is located within the project record located at the headquarters office in Yreka, CA.

Background

Geographic Area Affected

On the west side of the Klamath National Forest, the terrain is extremely rugged, with total relief in excess of 7,500 feet and hillslopes commonly steeper than 65 percent. The Klamath Mountains are also characterized by steep ecological gradients, high vegetation, wildlife, and fish diversity, with numerous species including the federal Endangered Species Act (ESA)-listed northern spotted owl and Coho Salmon and the federal ESA candidate Pacific fisher. Annual precipitation ranges from approximately ten inches in eastern valleys to over 70 inches in the highest elevations. Climate is essentially Mediterranean, and watershed hydrology is characterized by dry summer and fall months followed by significant winter precipitation. Morphology and function of the steep stream channels is controlled by large floods and associated landslides and debris flows.

Prior to the 2014 fires, vegetation types within the project area generally consisted of oak, brush, grass, and mixed conifers. Oaks, brush, and grasses are typically found on low-elevation sites on shallow, rocky soils located on the southerly and westerly aspects. These southerly and westerly aspects exhibit harsher conditions as opposed to the northerly and easterly aspects. As elevations increase, conifer species become more prevalent, primarily as a function of higher precipitation amounts. Deeper, more developed soils than those at low elevations support mixed conifer stands of Douglas-fir, ponderosa pine, incense cedar, and sugar pine. Higher elevation sites within the project area are favorable conditions for red fir and white fir survival and growth, with white fir becoming a substantial component of the mixed conifer type. Hardwood species, including Pacific madrone, California black oak, canyon live oak, Oregon white oak, tanoak, and bigleaf maple are generally a minor component of mixed conifer stands.

Few forested regions have historically experienced fires as frequently and with such high variability in fire severity as the Klamath Mountains Bioregion (Skinner, 2006). Within the bioregion, lightning has accounted for 74 percent of ignitions and 82 percent of burned areas, and median fire return interval ranges from eight to 38 years (Taylor, Skinner, and Agee, 2006). A great portion of the landscape had remained unburned from 20 to 100 years prior to the 2014 fires. Fire will continue to be a presence on the Klamath Mountain landscape and shape future vegetation, fuel loadings, and fire severity patterns.

Emergency Triggering Event

Severe drought and exceptionally dry fuel conditions made the 2014 fire season one of the most impacting in the history of the Klamath National Forest. The following is an outline of some of the difficult conditions that characterized the season:

- Three consecutive years of drought resulted in record low snowpack, rainfall, and stream flows.
- Live and dead fuel moistures were at record historic lows, with numerous days setting new records for severe wildfire burning conditions.
- Over the course of the summer, five separate waves of lightning storms affected the Forest, setting a total of 127 wildfires (an additional 12 wildfires were human-caused).
- Twenty severe fire weather warnings (“Red Flag Warnings”) were issued by the National Weather Service between July 29 and August 18, 2014, due to lightning and abundant dry fuels, strong winds, and low relative humidity.
- A total of 14 Mandatory Evacuations and 15 Evacuation Advisories were ordered by the Siskiyou County Sheriff’s Department as a result of threatening wildfire activity. These evacuations affected an estimated 800 residents. Extensive Forest road and area closures were also in effect for most of the fire season.
- Simultaneous wildfires burning in Oregon, Washington, and other parts of California resulted in limited resources (firefighting crews and aircraft) being readily available to the Forest during initial suppression efforts.
- Rugged mountainous topography, heavy fuel loadings (jackstraw fallen snags and trees), and limited access made fire suppression efforts extremely challenging.

Klamath-wide, the 2014 fire season ultimately burned about 210,000 acres. Restoration needs for all affected acres were identified. Some fires, or portions of fires, burned within wilderness areas, where natural processes drive restoration. Restoration needs of the 5,500-acre Little Deer fire (located on the east side of the Forest), have been identified and analyzed through a stand-alone Environmental Analysis. The Westside Fire Recovery project is composed of the other large fires (or portions of fires) that burned during 2014 - the Beaver Fire, Happy Camp Complex, and the Whites Fire of the July Complex.

The Beaver Fire, Happy Camp Fire, and Whites Fire burned a total of 183,200 acres, including 162,300 acres of National Forest System lands and 20,800 acres of private land. See Table 1-1below.

Table 1-1: General fire information

Project Area	Fire	Fire Start Date	Containment Date	Acres Burned: Forest Service	Acres Burned: Private	Total Acres Burned
A	Beaver Fire	July 30, 2014	August 30, 2014	14,600	17,800	32,400
B	Happy Camp Complex Fire	August 12, 2014	October 29, 2014	114,800	2,100	116,900
C	Whites Fire	July 31, 2014	September 25, 2014	32,900	900	33,800
Total of All Fires (acres)				162,300	20,800	183,100

Fires within the Happy Camp Complex were ignited by lightning near the town of Happy Camp, which is located on the middle portion of the Klamath River. Nineteen fires were ignited in this storm and comprised the complex. Due to hot, dry and windy conditions, three of the original 19 fires could not be readily contained, eventually grew together and spread east to the Scott River and south into the Marble Mountain Wilderness over the course of several weeks. This fire burned approximately 133,000 acres. The Beaver Fire occurred on the north side of the Klamath River about 30 miles east of Happy Camp, and eventually consumed approximately 32,000 acres. The July Complex was comprised of the Log and Whites Fires, which burned approximately 37,000 acres southeast of Fort Jones. The July Complex burned both private and National Forest land, ultimately spreading into the Marble Mountain Wilderness and into the North Fork drainage of the Salmon River.

Resources Affected

The fires burned extensive portions of the Klamath River, Scott River, and Salmon River watersheds on the western half of the Klamath National Forest. Dozens of tributary drainages in these watersheds were affected. Large portions of late successional reserves and habitat burned with high severity fire. A substantial amount of long-term wildlife habitat was lost as a result of the 2014 fire season, including an estimated 31,000 acres of northern spotted owl (a federally listed species under ESA) habitat and an estimated 47,000 acres of Pacific fisher (a candidate for listing under ESA) habitat [5].

All the large fires of the 2014 season burned with mixed severity, meaning there was a mosaic of light, moderate, and severely burned forests within each fire area.

Table 1-2 below describes the percentage of vegetative canopy killed (basal area). See the Rapid Assessment of Vegetation Condition maps by fire in appendix A.

Table 1-2: Percentage of vegetative canopy killed (basal area)

Fire Severity	Percentage (%) Vegetative Canopy Killed (basal area)	Beaver %	Happy Camp %	Whites %	Total
Very Low	0-25	43	62	63	59
Low	25-50	10	8	6	8
Moderate	50-75	7	6	5	6
High	75-100	40	23	26	27

Of the approximately 185,000 acres that burned on the western Klamath National Forest, approximately 27 percent exhibit very high vegetation burn severity effects. Within high severity areas, fuel consumption of duff, conifer and hardwood litter, saplings, and small and large dead material occurred within the ground and surface profile. Full consumption of canopy foliage and small branches within the crown stratum has left standing dead trees that are storing a tremendous amount of biomass available for future surface fuel accumulation. Areas of high severity burns experienced 75 percent or greater vegetation mortality, loss of canopy and understory cover, and loss of duff layers and large woody debris. The stands that burned at high severity ranged in species composition and structure, including shrub/oak stands, single layered conifer plantations, multi-layered mixed conifer stands, and higher elevation stands dominated by true fir. Most trees within high severity burn areas are expected to die in the short term.

Approximately six percent of the fire areas burned with moderate severity. Areas characterized by moderate severity burns experienced 50-75 percent vegetation mortality, substantial reduction in canopy and understory cover, as well as duff layers and large woody debris. Moderate severity fire areas generally experienced consumption of surface fuels leaving the canopy structure primarily intact; however, the conifer and hardwood canopies are generally brown needle foliage. Dead fuels contribute to surface fuel loading and will decay slowly. Small shade-tolerant trees fill in the mid-story canopy connecting the upper canopy fuel profile (ladder-effect) of the larger fire resilient trees on the landscape resulting in high severity effect in many forested lands. A substantial portion of the trees within moderate severity areas have either been killed by fire or are expected to experience high mortality due to fire injury, insects, and the effects of prolonged drought. Continued overall low levels of rainfall and particularly low snowfall amounts this winter are not alleviating drought conditions in northern California. These continuing relatively

[5] Numbers are based upon habitat acres lost within the proposed Westside Fire Recovery project; it is likely that a larger amount of habitat was lost outside of the Beaver Fire, Whites Fire, and Happy Camp Complex perimeters which make up this project's boundary.

dry conditions will further decrease the survivability of fire damaged trees, even in areas that burned in lower severity.

Areas characterized by no or low severity burns experienced 0-50 percent vegetation mortality and a reduction in fuel loading. In low severity burn areas, most of the stand mortality occurred in smaller understory trees. Over time, these smaller trees will fall to the forest floor and contribute to future fuel loading, but in much smaller quantities than in the moderate to high severity burn areas.

Burned Area Emergency Response

Burned Area Emergency Response (BAER) actions completed or currently underway aim to identify and manage imminent, unacceptable threats to human life, safety, property, and critical natural and cultural resources on National Forest lands. BAER actions include repairing road drainages (grading, culvert cleaning, installation of rolling drainage dips, etc.), felling only imminent hazard trees along roads, and posting closure signs along roads and trails. Hazard trees felled during fire suppression and BAER activities were very limited in scope and consisted of only older dead, decomposed, and structurally unsound trees along only the most frequented of roadways. Due to the objectives of BAER activities and the scale of the fire impacted area, most of recently fire-killed trees (snags) were considered to be structurally sound at the time of BAER and were left standing. As snags along the roadways in burned areas are exposed to winter rains, snow, and winds and subsequently deteriorate and decay, threats to human health and safety substantially increase. While BAER activities mitigate many of the immediate hazards, additional emergency actions are needed to address the remaining safety concerns and to move the affected areas towards recovery.

Westside Fire Recovery Project

The Westside Fire Recovery project was developed in response to landscape-level changes to forested habitat resulting from the 2014 wildfires on the Klamath National Forest. Forest Service resource specialists began evaluating conditions in the project area immediately following the fires. The BAER analyses provided resource assessments on the fires’ effects on soils, watersheds, vegetation, and wildlife. Post-fire inventories of the transportation system were conducted to obtain condition status. Field crews conducted surveys on forested stands to collect data on stand mortality and timber salvage viability. Soil burn severities and vegetation burn severities were mapped to determine the changed post-fire conditions. The initial post-fire assessments were completed by the fall of 2014. Resource specialists used this information to make recommendations to the responsible official, Forest Supervisor Patricia Grantham, for developing the proposed action.

The Forest has prepared this draft EIS to analyze and disclose the effects of proposed treatments included in the Westside Fire Recovery project. An EIS is required due to the scope of the proposed treatments and the potential for significant impacts, especially to the ESA-listed northern spotted owl and its critical habitat. The project’s purpose and need is to address the following:

- There is a need for worker and public safety and access.
- There is a need for safe conditions for firefighters performing fire suppression for community protection.

- There is a need for a project that is economically viable[6], meeting project objectives and benefitting our local communities.
- There is a need for restored and fire-resilient forested ecosystems.

See the purpose and need section of this chapter for a detailed description of the purpose and need.

The project area comprises 218,600 total acres, including 187,100 acres of National Forest System land and 31,500 acres of private land. It is divided into three subparts: project area A (Beaver Fire), project area B (Happy Camp Complex), and project area C (Whites Fire of the July Complex). See the vicinity map (appendix A). The boundary was extended beyond the fire perimeters in order to incorporate hazardous fuel reduction treatments and fire breaks within one-quarter mile of private property structures. See chapter 2 for a description of the proposed action and its alternatives.

Table 1-3: Acres burned within the project area on private and National Forest System lands by fire area.

Project Area	Fire	Forest Service Project Area (acres)	Private Lands within Project Area (acres)	Total Acres within Project Area
A	Beaver Fire	19,000	24,800	43,800
B	Happy Camp Complex	127,000	5,400	132,400
C	Whites Fire	41,100	1,300	42,400
Total Project Area (acres)		187,100	31,500	218,600

Table 1-4: General location by project area

Project Area	Fire	Legal Location Township (T), Range (R), and Section (S)	Elevation Range (Feet)	Watershed (5th Field)
A	Beaver Fire	Mt.Diablo: T46N R8W S 2-7, 9-11; T46N R9W S1-13,18; T46N R10W S1-3,10-15;T47N R8W S4-10,15-22, 27-35; T47N R9W S1, 9-17, 20-36; T47N R10W S 25, 34-36	1,700-6,300	Beaver Creek, Horse Creek-Klamath River, Humbug Creek-Klamath River

6 The Forest Service needs to obtain the maximum commodity value from burned timber by offering a sale while the wood is still marketable. Maximizing the commodity value of the timber provides the agency a means for meeting project needs, such as implementation of restoration.

Project Area	Fire	Legal Location Township (T), Range (R), and Section (S)	Elevation Range (Feet)	Watershed (5th Field)
B	Happy Camp Complex	Humboldt: T14N R8E S 5, 8,17, 20; T15N R7E S 1, 2,12,13, 24;T15N R8E S3-10,15-22, 27-28, 34; T16N R7E S1, 2,10-15, 23-25, 35, 36; T16N R8E S6-10,15-22, 27-34 Mt. Diablo: T43N R12W S2-11,14-20; T44N R10W S6; T44N R11W S1-11, 15-22, 28-30;T44N R12W S1-35; T45N R10W S5-9,16-21, 28-32; T45N R11W S1-36; T45N R12W S1-36; T46N R10W S31-32; T46N R11W S 16-22, 26-36; T46N R12W S 10-11,13-16, 20-36	1,100-7,400	Elk Creek[7], Horse Creek-Klamath River, Indian Creek,Lower Scott River, Seiad Creek-Klamath River[8], Thompson Creek-Klamath River, Ukonom Creek-Klamath River
C	Whites Fire	Mt.Diablo: T39N R10W S 1-11,17-18; T39N R11W S 1-3,10-15; T40N R8W S 6-7,18-19,30; T40N R10W S 2-36; T40N R11W S 1-4, 9-16, 21-28, 33-36; T41N R10W S 8-22, 27-35; T41N R11W S 24-25,33-36	2,200-8,000	French Creek-Scott River, North Fork Salmon River[9], South Fork Salmon River[10]

Management Direction

Direction for this project comes from the Klamath National Forest Land and Resource Management Plan (Forest Plan) of 1995, as amended; the Forest Plan incorporates direction from the Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents within the Range of the Northern Spotted Owl (Northwest Forest Plan). Other statutes, regulations, plans and policies that provide management direction for this project include, but are not limited to, the Endangered Species Act, the National Historic Preservation Act, the Clean Water Act, the Clean Air Act, Recovery Plans for northern spotted owls and Coho Salmon, as well as Forest Service directives. The project is designed to be consistent with all applicable laws, policies and plans, and to consider information in guidance documents such as Watershed Analysis, the National Fire Plan, and Forest Fire Management Plan.

Key direction for this project comes from the Forest Plan's forest-wide standards and guidelines, and those specific to management areas that are found within the project area, as described in Table 1-5. This project includes design features listed in chapter 2 that were developed to reduce impacts to resources and to meet the standards and guidelines of the Forest Plan. For further information pertaining to meeting the requirements of the Forest Plan, please see the Forest Plan Consistency Checklist, available in the project record.

[7] Key Watershed from the Forest Plan
[8] The Grider Creek 6th field portion of this 5th field watershed is identified as a Key Watershed in the Forest Plan
[9] Key Watershed from the Forest Plan
[10] Key Watershed from the Forest Plan

Much of the project lies within the wildland urban interface (WUI) Community Threat Zone as described in the Forest Fire Management Plan. There are two federally-listed threatened species in the project area: northern spotted owl (*Strix occidentalis caurina*) and Coho Salmon (*Oncorhynchus kisutch*) and one species proposed for listing, the Pacific fisher (*Martes pennanti pacifica*). Within the project area, there is U.S. Fish and Wildlife Service-designated critical habitat for northern spotted owl (USDI Fish and Wildlife Service, 2012), and National Marine Fisheries Service-designated critical habitat for Coho Salmon (May 5, 1999, 64 FR 24049). The project is designed to be consistent with the Recovery Plans for both species. The project is located within the North and South Fork Salmon River, Elk Creek, and the Grider section of the Seiad Creek-Klamath River key watersheds; management direction for key watersheds in the Forest Plan (pages 4-25 through 4-26) applies to activities in the project.

The 1995 Forest Plan includes standards and guidelines from the Northwest Forest Plan. The Forest Plan provides forest-wide and management area direction for project-level projects. The project is designed to be consistent with all applicable law, regulation, policy, and direction. Management areas within the project area are described in Table 1-5.

Table 1-5: Notable Forest Plan management area goals for management areas found within the project boundary[11]

Management Areas (MA)	Pages in Forest Plan	Notable Forest Plan Goals
MA1- Research Natural Area[12]	4-67 to 4-69	Not applicable
MA2- Wilderness	4-70 to 4-75	Not applicable
MA3- Recommend and Designated Wild River[13]	4-78 to 4-79	Ecological processes shall shape the vegetative patterns within the management area. The salvage of dead trees, or the reforestation of these areas following catastrophes, should not be permitted. Schedule no timber harvest from this management area (pp. 4-78 to 4-79).
MA12- Recommended and Designated Scenic River	4-117 to 4-119	A wide range of silvicultural treatments may be used to meet Scenic River objectives. Salvage of trees killed by wildland fire, pest infestations or other natural processes is permitted consistent with area resource management goals. Salvage and reforestation efforts are a moderate priority. Minimize the loss of timber value where possible (pg. 4-119).
MA13- Recommended and Designated Recreational River	4-120 to 4-122	Lands may be managed for a full range of silvicultural uses, to the extent currently practiced. Timber harvesting would be allowed under standard restrictions to protect the immediate river environment, water quality, scenic, fish and wildlife and other values. Schedule moderate timber yields, compatible with area goals (pg. 4-122)
MA 5- Special Habitat: Late Successional Reserves (LSRs) Falcon and Eagle	 4-82 to 4-89; 4-92 to 4-93; 4-90 to 4-92	 Conditions of late-successional forest ecosystems are enhanced to serve as habitat for late-successional species. Continuous areas of multi-layered forests with high quality habitat characteristics and attributes are common (pg. 4-83). Vegetation removal to eliminate public hazards and salvage are permitted if it benefits habitat (pp. 41 and 4-93).
MA7-Special Interest Area	4-97 to 4-100	Salvage of burned or pest-killed trees may be allowed to promote the management goals and objectives of the SIA. Reforestation of these areas to meet SIA objectives shall be a high priority (pg. 4-99).
MA10-Riparian Reserves[14]	4-106 to 4-114	Fall roadside safety hazard trees. Allow the removal of these trees where woody debris requirements are met (pg. 4-113).
MA 11- Retention Visual Quality Objective (VQO)	4-115 to 4-116	Salvage of trees killed by wildland fire, pest infestation or other natural processes is permitted consistent with area goals (pg. 4-116)
MA 15- Partial Retention VQO	4-126 to 4-127	An attractive, forested landscape is provided and is maintained for a sustained yield of wood products in areas capable, available, and suitable for timber production. Forested stands are resilient to wildland fire, insect, disease, and other damage (pg. 4-126).
MA 17- General Forest	4-131 to 4-132	A programmed flow of timber is provided, which is sustainable through time. Conifer stocking levels and high growth rates are maintained commensurate with the capability of the site to produce wood fiber. Forested stands are resilient to wildland fire, insect, disease, and other damage (pg. 4-131).

[11] See the Forest Plan consistency checklist in the project record for detailed information about project consistency by applicable standard and guideline.
[12] All of MA1 overlaps MA2.
[13] All of MA3 overlaps with MA2 with exception of about 40 acres.
[14] Riparian reserves overlap with most other management areas. No treatment is proposed within riparian reserves, except roadside hazard treatment and within one-quarter mile of private property structures.

Purpose and Need for Action

There is a need to close the gap between the existing and desired condition (Table 1-6), while protecting forest resources within the project area.

There is a need for worker and public safety and access.

Fire-killed trees (i.e. snags) are often unstable and at risk for falling or snapping off. As snags in burned areas are exposed to winter rains, snow, and winds and subsequently deteriorate and decay, risk to human health and safety substantially increase. Snags need to be addressed in order to minimize unnecessary safety hazards for the public who recreate in the area. Safety for forest workers also needs to be provided. Forest workers will work within the burned areas in the years to come accomplishing reforestation, fuels reduction, and other resource management activities. Hazard trees also threaten public and worker access along miles of roads. It is also imperative that infrastructure, especially utility lines, roads, trailheads, campgrounds, fire lookouts, and bridges are maintained for use by the public and workers.

Proposed activities to address this component of the purpose and need include:

- Salvage harvest of fire-killed trees in selected areas.
- Salvage of fire-killed and other hazard trees along roadways and near infrastructure.
- Removal of roadside hazard trees to maintain current and future safe ingress and egress from the forest.

There is a need for safe conditions for firefighters performing fire suppression for community protection.

As snags continue to decay, break, and fall, surface fuel loading and the severity and intensity of future fires will increase. Increased fire intensities and fallen snags will inhibit the effective control of future fires and/or put fire suppression crews at increased risk. Fallen hazard trees will also impact road access along miles of roadways, impairing fire suppression efforts. Local communities and residential enclaves are nestled within and adjacent to forests in a fire-adapted ecosystem. Hazardous trees and fuels conditions need to be abated, where they exist within the wildland urban interface, especially within one-quarter mile of private property in burned areas and other strategic areas in order to have better conditions for suppressing future fires and protecting lives and property of our local communities.

Proposed activities to address this component of the purpose and need include:

- Salvage harvest of fire-killed trees in selected areas.
- Salvage of fire-killed and other hazard trees along roadways and near infrastructure.
- Removal of roadside hazard trees to maintain current and future safe ingress and egress from the forest.
- Creation of shaded fuel breaks on selected strategic ridgetops to facilitate future fire suppression efforts.
- Fuels reduction by piling and burning fuels, mastication of fuels, and underburning within the wildland urban interface and other strategic areas.

- Planting in certain areas also improves fuel conditions by promoting forested conditions over brush field conditions, which improves future fuels conditions and fire control.

There is a need for a project that is economically viable, meeting project objectives and benefiting our local communities.

The Forest Plan directs the Forest to harvest dead or dying trees for the production of wood products, as consistent with Forest goals. Because of decay, dead timber loses significant commodity value if left standing too long and is most profitable if harvested as soon as possible. For this reason, it is important to offer timber sales while the wood is still marketable. Capturing the marketability of the fire-killed trees and hazard trees provides the agency a viable means of fully implementing the project and funding restoration, including reforestation for future wildlife habitat and the improvement of watershed conditions for fish habitat. Otherwise, the Forest Service will need to use appropriated dollars to remove only the snags and hazard trees most critical for public and worker safety and access. Much of the proposed project will not happen if appropriated dollars are the only funding mechanism. Capturing the maximum economic value of the salvaged timber also benefits Siskiyou County and the surrounding communities by maintaining and/or creating jobs in forest management and providing timber to the local mills which are major employers of these rural communities.

Proposed activities to address this component of the purpose and need include:

- Salvage harvest of fire-killed trees in selected areas.
- Salvage of fire-killed and other hazard trees along roadways and near infrastructure.

There is a need for restored and fire-resilient forested ecosystems.

Wildfires provide some benefits to forest ecosystems such as snag and downed wood creation and short-term fuels reduction in areas of low intensity burns. However, intensely burned forested areas may be slow to recover and heavy fuel loading will result from fallen snags. Following a high severity wildfire, heavy fuel loading predisposes an area to higher intensity and higher severity wildfires in the future. Such fires inhibit forest stand regeneration and result in stand type changes to brush or other non-forested vegetation types, delaying these lands from reaching the desired conditions of the Forest Plan or providing for future forested wildlife habitat per Forest Plan goals and direction. High intensity fires also put remaining wildlife habitat at risk of future loss. By reducing fuels created by the 2014 fires and replanting selected areas, the likelihood and speed by which burned, forested areas are restored is increased. This results in a more fire-resilient forested ecosystem for the benefit of wildlife habitat and watershed conditions.

Activities to address this need include:

- Salvage harvest of fire-killed trees in selected areas to prevent high fuel loads from fire-killed trees in the future.
- Fuels reduction by piling and burning fuels, mastication of fuels, and underburning within the wildland urban interface and other strategic areas.
- Replanting of burned areas with an appropriate species mix and spacing for the site.

- Retention of clumps of snags within treatment areas to ensure that habitat for snag-dependent species is retained.

Table 1-6: Existing and Desired Conditions

Statement of Need	Existing Condition	Desired condition
Worker and public safety and access	Infrastructure, including utility lines, roads, bridges, trailheads, campgrounds, and fire lookouts within the project area, are surrounded by fire-killed and damaged trees and preexisting danger trees that pose a hazard to the public and Forest workers and restrict access. As snags in burned areas are exposed to winter rains, snow, and winds and subsequently deteriorate and decay, risk to human health and safety substantially increase.	Public and forest worker access to public lands along all roadways and trailheads are unimpeded to the extent possible. Hazards from falling danger trees are mitigated to the extent possible, especially nearby roadways and other infrastructure. Salvage harvest areas have reduced amounts of snags, providing for improved safety conditions for forest workers.
Safe conditions for firefighters performing fire suppression for community protection	Within the wildland urban interface, local communities and residential enclaves are nestled within and adjacent to forests in a fire-adapted ecosystem. As snags continue to decay, break, and fall, surface fuel loading and the severity and intensity of future fires will increase. Increased fire intensities and fallen snags inhibit the effective control of future fires and/or put fire suppression crews at increased risk. Progressively increasing fuel loadings where potential flame lengths are projected to exceed four feet. Flame lengths over four feet are resistant to fire suppression tactics. Fallen hazard trees impact road access along miles of roadways, impairing fire suppression efforts.	Hazardous trees and fuels conditions are abated within the wildland urban interface, especially within one-quarter mile of private property structures. Fuel loading is reduced within strategic areas. Fuel breaks are created and maintained for community protection. Probability of future high-intensity wildfires is reduced. Fuel loadings commensurate with surface flame lengths of less than four feet (should the area burn again). Hazards from falling snags are mitigated to the extent possible, improving access for fire suppression and community protection. Risk and effectiveness of fire suppression is improved due to fire breaks, reduced fuel loading, reduced snags, and unimpeded access.
A project that is economically viable	The estimated volume and economic value of the timber is not yet captured. The project is not yet implemented and the benefits of improved safety, access, fuels conditions for fire suppression and community protect, and restored and fire-resilient forested ecosystems have not been achieved. Jobs for the local community have yet to be created.	Dead or dying trees are harvested to produce wood products as consistent with Forest goals. (Forest Plan, pages 4-131-132 and 4-49) The timber sale and receipts are used to fund project implementation and restoration work, including fuels reduction, reforestation for future wildlife habitat, and the improvement of watershed conditions for fish habitat. Private industry jobs in the forest management sector of the county will be created and/or maintained.

Statement of Need	Existing Condition	Desired condition
Restored and fire-resilient forested ecosystems	Within the wildland urban interface, local communities and residential enclaves are nestled within and adjacent to forests in a fire-adapted ecosystem. Approximately 27% of the fire areas exhibit high vegetation burn severity (75-100% vegetative canopy killed) effects. Most trees within high severity burn areas are expected to die. Approximately 6% of the fire areas burned with moderate severity (50-75% vegetative canopy killed), and a substantial portion of those trees have been killed by fire, and surviving trees are expected to experience high mortality due to fire injury, insects, and the effects of prolonged drought. Progressively increasing fuel loadings where potential flame lengths are projected to exceed four feet. Flame lengths over four feet are resistant to fire suppression tactics. A substantial amount of long-term wildlife habitat was lost as a result of the 2014 fire season, including an estimated 31,000 acres of northern spotted owl (a federally listed species under ESA) habitat and an estimated 47,000 acres of Pacific fisher (a candidate for listing under ESA) habitat. Progressively increasing fuel loadings where potential flame lengths are projected to exceed four feet. Flame lengths over four feet are resistant to fire suppression tactics. Large portions of late successional reserves and habitat burned with high severity fire. Extensive portions of the Klamath River, Scott River and Salmon River watersheds burned. Tributary drainages in these watersheds were affected.	The long-term desired future condition for the project area is a healthy forested landscape with diverse ecosystem conditions reflective of historic vegetation and the ecological capability of the landscape. This includes some natural openings and native browse species vegetation within a largely continuous conifer-dominated landscape. To the extent possible, fire will play a natural role in the ecosystem. However, the desired condition will also include reduced risk of high intensity fire within the wildland urban interface. Fuel loadings commensurate with project surface flame lengths of less than four feet. Within late successional reserves, in the short term, clumps of leave snags will provide post-fire habitat components for a variety of wildlife species. In the long term, a conifer overstory with some understory vegetation components will provide forage and cover for wildlife species. The probability of the loss of remaining or future wildlife habitat from high severity wildfire is reduced. In the long term, fire-resilient forested ecosystems experience less high severity fires, lessening impacts to watershed conditions from future fires.

Proposed Action

After scoping, the project area was adjusted based on more accurate information following field review of the three project areas. After refining the project area boundary since scoping about 62,400 acres will now be considered for treatment with some overlap of treatments limiting the footprint of the project to about 50,900 acres. After scoping, the proposed action was refined to respond to scoping comments and internal issues.

The Westside Fire Recovery project, as described in the scoping notice for the project issued in September 2014, included four overlapping types of treatment: (1) salvage; (2) roadside hazard treatments; (3) hazardous fuel treatments; and (4) site preparation, planting, and release. In addition to the above treatments, the proposed action, as scoped, included access for treatment along 506 miles of National Forest System roads and 172 miles of state and county roads.

See project website http://www.fs.fed.us/nepa/nepa_project_exp.php?project=45579 for a description of the proposed action as scoped.

The following modifications or clarifications were made following scoping:

- Acres were adjusted after further field review. Alternative 2 includes four overlapping treatments: (1) 11,700 acres of salvage units[15]; (2) 650 miles of roadside hazard reduction; (3) 22,900 acres of hazardous fuel treatments; and (4) 7,900 acres of site preparation, planting, and release in existing plantations and seedling/sapling natural stands that burned. All salvage harvest units (11,700 acres) will also be site prepped and replanted with appropriate species. In addition to the above treatments, Alternative 2 would use 562 miles of National Forest System, state, and county roads, reopen 9.0 miles of previously decommissioned roads, use 9.9 miles of existing temporary roadbeds and construct 3.6 miles of new temporary roads within the project area.
- Consideration for treatment for the salvage harvest treatment units used the following criteria:

  1. Areas of moderate to high severity vegetation mortality with more than ten contiguous acres of medium to high severity vegetation mortality and less than 40 percent crown closure;
  2. Areas determined to be feasible in terms of logging systems, accessibility, and economics; and
  3. Units outside of northern spotted owl activity center core areas where the home range contained a minimum threshold of 700 acres of nesting/roosting and foraging habitat and more than 50% nesting, roosting and foraging habitat in the core area was intact.

- Salvage harvest treatment will identify trees for harvest using the Report #RO-11-01 "*Marking Guidelines for Fire-Injured Trees in California*" (Smith & Cluck, 2011).

[15] Treatment in salvage harvest units is limited to moderate to high severity areas (>50% mortality) outside of riparian reserves. An estimated 6,800 acres of fire-killed trees would actually be removed. See chapter 2 for a complete description of harvest units.

These guidelines are peer-reviewed scientific literature used to evaluate tree species in northern California for mortality. Trees considered for salvage harvest removal include merchantable timber defined as trees greater than 14 inches in diameter. Fire-damaged green trees with a 70 percent or higher probability of mortality in the next three to five years were included in the salvage harvest proposal. These treatments will be accomplished by a combination of ground-based, skyline, and helicopter logging systems.

- Roadside hazard reduction (removal of fire-killed trees) is proposed within 250 feet on either side of selected roads to address hazards. A hazard, or danger, tree is defined as a standing tree that presents a hazard to people due to conditions such as deterioration of or damage to the root system, trunk, stem, or limbs or the direction or lean of the tree (29 CFR 1910.266(c); FSH 6709.11, glossary). Because of slope, a few fire-killed trees farther than 250 feet from a road may still present a hazard to the road and thus need to be treated, but the majority of hazard trees will be within the 250-foot buffer. Roadside hazard treatments will include the use of ground-based, skyline, and helicopter logging systems. Acres used for analysis were calculated using all fire severity classes within a 200 foot buffer on either side of affected roads[16]. GIS was used to narrow down the amount of acres of roadside hazard considered for hazard tree removal. Approximately 20,500 acres would be considered for roadside hazard reduction on 650 miles of roads. Of those 20,500 acres, approximately 16,600 acres are coniferous forest; 660 acres are hardwood forest and about 3,250 are shrubs and brush or are not vegetated. For conifer and mixed conifer forests, diameter ranges were broken into three categories: (1) up to ten inches (6,200 acres), (2) ten to 20 inches (4,700 acres), and (3) greater than 20 inches in diameter at breast height (5,700 acres). Of the hardwood stands (660 acres) 630 acres were with tree diameters less than 20 inches; approximately 30 acres were with tree diameters greater than 20 inches.
- For roadside hazard removal, fire-damaged green trees with a 60 percent or higher probability of mortality within the next three to five years were included in the salvage harvest proposal. Actual distance of roadside hazard treatments may vary based on the Regional Hazard Tree Guidelines for Forest Service Facilities and Roads in the Pacific Southwest Region (Angwin et al. 2012).
- Hazardous fuel treatment areas were considered based on the following criteria:
    1. 200 feet on either side of selected Forest roads (including maintenance level 1 roads), prioritized based on volume of road use, evacuation routes, and ridge-top roads used for suppression efforts.
    2. 250 feet on either side of historically-significant ridgelines for fire suppression efforts.
    3. Areas determined feasible in terms of slope, accessibility, existing fuels conditions, and logical holding features (i.e. roads, streams, and ridges).

[16] Hazard tree removal is proposed within 250 feet on either side of selected roads. Topographic breaks and unstocked areas without hazard trees will reduce the actual treated acres. For the purposes of analysis, a 200 foot buffer was used to estimate the acres where treatment may occur.

- Hazardous fuels treatments include wildland urban interface, fuels management zones, roadside fuels, prescribed burn, and site-preparation. The following are summarized descriptions of each treatment type.
    1. Wildland Urban Interface: combination of mechanical and hand work. Removing standing dead trees 12 inches or less in diameter at breast height and other understory vegetation in order to reduce fire behavior activity, specifically reduced flame length and intensity and reduced potential for crown fire activity.
    2. Fuels Management Zones: maintain existing strategic ridge systems used to contain the 2014 fires as well as historic fire lines from previous large fires within the project area. Treatments will include removing all dead vegetation and live understory vegetation along with live conifer trees less than 12 inches in diameter at breast height. Pruning retained conifers up to seven feet high within these zones will increase canopy base height and reduce the potential for crown fire initiation. Activity-generated fuels will be disposed of by a variety of methods to meet desired conditions.
    3. Roadside Fuels Treatments: same as above, but along roadsides identified as strategic for fuels reduction and in hazard tree removal areas to decrease the amount of activity-generated fuels.
    4. Prescribed Burn: use existing control lines established in recent large fires within the project area. Line construction activities will occur around the perimeter of the fire and will include using dozers to re-scrape control lines to mineral soil; where control lines are inaccessible for equipment, handline construction to mineral soil will occur. Removal of understory vegetation along control lines will include cutting brush and conifer trees less than 12 inches in diameter to facilitate holding operations during prescribed fire implementation.
    5. Site-Preparation: this treatment will work in coordination with the site-preparation, planting, and release treatment proposed below and will reduce existing fuels while increasing the likelihood that newly planted vegetation will successfully regenerate. This treatment includes maintenance which will include thinning of understory vegetation and piling of surface fuels to maintain desired fuel conditions.
- The description of criteria considered to determine priority site preparation and planting was modified for clarification.
- Site preparation, planting, and release treatments include treatment in plantations, natural stands (non-salvage harvested), and salvage harvest stands. The following is a summary of each treatments:
    1. Site preparation will include yarding, mastication, windrowing, and piling of dead material generally up to 16 inches in diameter. In some areas trees larger than 16 inches will be treated in order to reduce hazards to workers, the public, and reduce fuel loading to achieve flame lengths of less than four feet over the next 20 years. Hand treatments will include the cutting and piling of dead fuels up to ten inches in diameter.
    2. Reforestation will be by hand methods, using either bare root or container stock. Hand planting will increase the likelihood for survival and provide for the desired spatial variability within treatment units and across the project area. Tree species used for planting will include Douglas-fir, sugar pine, ponderosa pine, incense cedar, white fir, and red fir. A mosaic distribution will be achieved over time due to the spatial variability achieved by the planters' micro-site selection. An average

of 130 to 300 trees per acre will be planted to achieve acceptable levels of stocking, depending on the site conditions.
3. Release includes manually removing all vegetation within a minimum of a five-foot radius from a planted or naturally regenerated conifer seedling.

- Riparian reserves within the plantation site-preparation and planting units in the Whites Fire and Happy Camp Complex will be treated to achieve ground cover and allow for natural regeneration of vegetation. Treatment will be focused in areas of high and moderate vegetation mortality and where the overhead hazards can be mitigated without equipment entry into the riparian reserves. Treatment will include hand-work only (no ground-based equipment) and lop-and-scatter or other fuels reduction will be implemented if fuel loading is above seven tons per acre; fuels may be hand-piled or windrowed and burned.
- Landing size will be commensurate with operational safety, using existing landings where possible. Helicopter landings will be up to two acres in size. Skyline landings will utilize roads wherever possible; new skyline landings off the road system, and ground-based landings, will average one acre in size but will not be larger than 1.5 acres in size.
- Legacy sediment sites were identified since scoping and will be scheduled for treatment in compliance with the Clean Water Act as a condition of the North Coast Regional Water Quality Control Board waiver of waste discharge requirements (Order No. R1-2010-0029).

Decision Framework

The responsible official for this project is Patricia A. Grantham, Forest Supervisor. This environmental impact statement is not a decision document; it discloses the environmental consequences of implementing the no action alternative or an action alternative. The environmental impact statement also aids the responsible official in determining whether the effects disclosed will have a significant effect on the environment. After analyzing and responding to public comment, the responsible official will make a decision and issue a Record of Decision.

Within the Record of Decision, the responsible official will determine whether to implement the proposed action, an alternative to the proposed action, or choose no action at this time. The final decision will be based on the information in this document and the supporting information contained in the project record, consideration of public comments, how well the selected alternative meets the purpose and need for the project, and whether the selected alternative complies with agency policy, applicable state and federal laws, and Forest Plan direction.

Emergency Situation Determination

In order to facilitate implementation of the project, the Forest is seeking an Emergency Situation Determination pursuant to 36 CFR 218.21. Under 36 CFR 218.21(d), a proposed action is not subject to the pre-decisional objection process if the Chief or Associate Chief of the Forest Service determines that an emergency situation exists with respect to all or part of the proposed action or activity. 36 CFR 218.21(b) defines an emergency situation as:

> *a situation on National Forest System (NFS) lands for which immediate implementation of a decision is necessary to achieve one or more of the following: relief from hazards threatening human health and safety; mitigation of threats to natural resources on NFS or adjacent lands; avoiding a loss of commodity value sufficient to jeopardize the agency's ability to accomplish project objectives directly related to resource protection or restoration.*

Alternative Arrangements

In order to facilitate implementation of this project, the Forest Service requested and received alternative arrangements with the Council on Environmental Quality pursuant to 40 CFR 1506.11, which states:

> *Where emergency circumstances make it necessary to take an action with significant environmental impact without observing the provisions of these regulations, the Federal agency taking the action should consult with the Council about alternative arrangements.*

The Forest Service received alternative arrangements that shortened the 45-day comment period requirement for the draft EIS by 15 days, resulting in a 30 day comment period (40 CFR 1506.10(c)).

The Forest Service is also requesting alternative arrangements with the Council on Environmental Quality to:

- Eliminate the 90-day requirement between the notice of availability of the draft EIS and the Record of Decision (1506.10(b)(1)) and
- Eliminate the 30-day wait period between the final EIS and the Record of Decision (40 CFR 1506.10(b)(2)).

Public Involvement

Pre-Scoping

The Forest Service conducted robust public engagement throughout the summer while the fires were active and during suppression repair, and burned area emergency response (BAER) activities. During the summer, members of the community expressed interest in suppression and related repair activity and in the next steps of fire recovery proposed in the Westside Fire Recovery project. The agency's public engagement efforts that began this summer during the fires are being used as a platform on which to continue public engagement efforts and interest related to Westside Fire Recovery project. Prior to scoping the Forest Service:

- conducted 34 public meetings during fire operations to explain operations, extent, and impacts of wildland fires on the forest;
- delivered 200 press releases in local and internet media to give updates and conditions on fire and suppression activity, also conducting multiple radio and television interviews during fire suppression activities; and,
- posted to social media (i.e. Facebook) throughout suppression activities, reaching about 50,000 unique users at the height of activity.

Following the fires, the Forest conducted eight BAER meetings in the affected communities. In mid-November, the Forest is conducted eight community-based after action reviews and after action reviews with other agency and community cooperatives to gather public feedback on the fire suppression efforts and encourage participation in the Westside Fire Recovery project.

Scoping

The project was first published to the Schedule of Proposed Actions and the Forest website on October 1, 2014. On October 8, 2014 scoping letters were sent to interested and affected parties, including other public agencies, tribes, adjacent property owners, and interested groups and individuals.

A Notice of Intent to prepare an Environmental Impact Statement for the Westside Fire Recovery project was published in the Federal Register on October 15, 2015. The notice asked that comments on the proposed action be received within 30 days following publication in the Federal Register. On October 14, 2014 a legal notice of scoping was published in the Siskiyou Daily News, beginning the formal scoping process that guides the development of the draft EIS. Comments received by November 14, 2014 were considered in identifying issues and project development.

The Forest is using news releases and social media to inform broader audiences. The Forest has created a project website[17] to provide an independent electronic news outlet, as well as the standard legal notices and public notifications to meet the requirements of the NEPA. Field trips and public open house meetings in the local communities of Yreka, Fort Jones, Scott Bar, Sawyers Bar, Happy Camp, Klamath River, and Seiad have occurred and will continue to be used to inform, consult, and involve interested parties in an interactive, in-person manner. These efforts will also help us gauge public understanding and perception of the project. The Forest Service has also met with representatives of the timber industry regarding this project in order to gauge industry interest and capacity for salvage harvest using commercial timber sales.

The Forest Service first briefed the Siskiyou County Board of Supervisors October 21, 2014 to present Westside Fire Recovery proposal and take comments. The comments received as a result of public scoping are summarized in appendix C. The interdisciplinary team met and reviewed the scoping responses the week of December 15, 2014 to formulate issues concerning the proposed action.

Beyond the Forest's typical means of outreach, the Westside Fire Recovery project has also inspired the creation of two local collaborative groups:

- On January 6, 2015, the Siskiyou County Board of Supervisors unanimously approved the formation of a Citizens' Advisory Committee, charged with developing consensus recommendations for the Board to consider in responding to federal and state agencies on a variety of topics, including the Westside Fire

[17] http://www.fs.fed.us/nepa/nepa_project_exp.php?project=45579

Recovery project. An objective of the Board is to have the committee represent a broad spectrum of interests within Siskiyou County.

- The locally-based National Institute for the Elimination of Catastrophic Wildfire is forming a diverse citizens' collaborative group to address the Westside Fire Recovery project. The group ("The Westside Klamath Steering Committee") will be composed of Siskiyou County residents representing a wide range of interests who reflect the social and economic diversity within the affected area. The purpose of the group is to generate, through a collaborative process, consensus recommendations to the Forest Service, Siskiyou County Board of Supervisors, the California State Legislature, the Governor's Office, and the California Congressional Delegation regarding treatments for the Westside Fire Recovery project.

The two groups are not expected to compete with one another, but, rather, to complement each other in representing the views of Siskiyou County residents. It is anticipated that both collaborative groups will:

- serve as advocates for actions regarding the recovery and restoration of the Westside Fire Recovery project area that are reflective of, and responsive to, the needs of the residents of Siskiyou County;
- help evaluate the draft EIS; and
- suggest guidance for finding balance between protecting resources (such as wildlife, fisheries, and water quality) and protecting human life and safety, public infrastructure, private property, and communities.

Public Engagement in Support of Alterative Arrangements

The Forest Service and the Council on Environmental Quality considers the Westside Fire Recovery project to be an emergency action subject to the provisions of National Environmental Policy Act (NEPA) regulation 40 CFR 1506.11 Emergencies, which states:

> *Where emergency circumstances make it necessary to take an action with significant environmental impact without observing the provisions of these regulations, the Federal agency taking the action should consult with the Council about alternative arrangements. Agencies and the Council will limit such arrangements to actions necessary to control the immediate impacts of the emergency. Other actions remain subject to NEPA review.*

In order to facilitate implementation of this project, the Forest Service requested and received alternative arrangements with the Council on Environmental Quality pursuant to 40 CFR 1506.11, which states:

> *Where emergency circumstances make it necessary to take an action with significant environmental impact without observing the provisions of these regulations, the Federal agency taking the action should consult with the Council about alternative arrangements.*

The Forest Service received alternative arrangements that shortened the 45-day comment period requirement for the draft EIS by 15 days, resulting in a 30 day comment period (40 CFR 1506.10(c)).

The Forest Service is also requesting alternative arrangements with the Council on Environmental Quality to:

- Eliminate the 90-day requirement between the notice of availability of the draft EIS and the Record of Decision (1506.10(b)(1)) and
- Eliminate the 30-day wait period between the final EIS and the Record of Decision (40 CFR 1506.10(b)(2)).

The purpose for requesting alternative arrangements is to shorten the time required to publish a Record of Decision for the project so that salvage of fire-killed trees can begin as early in the summer of 2015 as possible. Fire-killed trees lose value rapidly. Delays in offering fire-killed trees for sale will reduce the marketability of the trees, and reduce the receipts received by the federal government from their sale. This will in turn reduce the ability of the Forest Service to accomplish other fire recovery actions which are dependent on receipts from the sale of the fire-killed trees. Leveraging the timber sales would provide for the removal of roadside hazard trees and snags within areas planned for reforestation or hazardous fuels reduction. Timber sale receipts would also allow for the quick and efficient reduction of hazardous fuels and protection of infrastructure, which would in turn reduce the intensity of future fires and provide for the safety of the public and forest workers. Timber sale receipts will fund reforestation work that is critical for restoration of watershed conditions for fish habitat and the creation of future wildlife habitat for the federally-listed northern spotted owl and other important wildlife species. In addition, capturing the maximum economic value of the salvaged timber would benefit the local counties and communities' economies.

Since the Forest Service is pursuing alternative arrangements to allow compressed time schedules for public review and comment, the Klamath National Forest has elected to conduct preliminary open houses and presentations to interest groups and governmental entities to share information with the public in advance of publication of the draft EIS.

It is the intent of the Forest Service that these preliminary open houses and presentations provide information for the public so that when the draft EIS is published, interested parties will be prepared to make informed comments on the proposed action and alternatives within the compressed time frame provided by alternative arrangements.

The Forest Service offered open houses prior to the release of the draft EIS as follows:

- Friday, January 30, 2015, 1800-2000 hours, Klamath National Forest Headquarters, Yreka, CA
- Saturday. January 31, 2015 1200 to 1400 hours, Fort Jones Community Center, Ft. Jones, CA
- Tuesday, February 3, 2015, 1800-2000 hours, Klamath River Community Center, Klamath River, CA
- Wednesday, February 4, 2015 1800 to 2000 hours, Karuk Senior Nutrition Center, Happy Camp, CA
- Friday. February 6, 2015, 1530 to 1730 hours, Salmon River Restoration Building, Sawyers Bar, CA

- Friday, February 13, 2015, 1800 to 2000 hours, Seiad Valley Volunteer Fire Department, Seiad, CA

Presentations of preliminary information to interested parties or local governmental entities prior to the release of the draft EIS were as follows:

- Monday, January 26, 2015, Timber Industry Field Trip, Happy Camp Complex area;
- Tuesday, January 13, Siskiyou County Board of Supervisors, Yreka, CA;
- Thursday February 5, 0645 to 0800 hours, Rotary Club of Etna, Etna, CA;
- Monday, February 23, The Westside Klamath Steering Group, associated with the National Institute for the Elimination of Catastrophic Wildfire, Northern California Resource Center, Fort Jones, CA;
- Wednesday, February 25, Happy Camp Fire Safe Council ; and
- Saturday, March 7, Siskiyou County Fire Chiefs Association, March 7, 1530-1730 hours, Forest Headquarters, Yreka, CA.

The Forest Service will provide presentations to other groups, as requested.

Preliminary maps of the proposed action and alternatives were provided to the Karuk Tribe and were also available for review by the public at the Scott River and the Happy Camp – Oak Knoll Ranger Districts and on the Klamath National Forest website. Preliminary maps of the proposed action were also provided to interested publics who wished to review the project area in the field in advance of publication of the draft EIS.

Notification of the open houses was shared through the Forest’s Facebook page, public website page notifications, and emailing more than 700 contacts including more than 30 media outlets (newspapers, broadcast and internet news sites) with the listing of venues and their respective dates and times. Meetings with local interest groups such as the Siskiyou County Fire Chiefs Association were scheduled with those groups at their request.

While less formal than public meetings, the open houses allowed for small group discussions, which provided the Forest with perspectives and insights into the opinions, local knowledge and values of the communities. At each open house, line officers, principle forest staff and members of the interdisciplinary team were available to answer questions and provide information. Maps and descriptions of the preliminary proposed action and alternatives were also provided. Members of the public were encouraged to provide comments for the record on provided flip charts. These comments were transcribed as closely to verbatim as possible and appear in appendix B. Attendance ranged from four to five people at Klamath River to over twenty people at Sawyers Bar.

Attendance was largely from members of the local communities where the open houses or presentations were held. At the Happy Camp open house, members of the Karuk Tribe natural resources staff were present and participated in discussions with the Forest Service in their personal capacities. At least one representative of an area environmental interest group provided comments at the Happy Camp meeting.

Comments and Discussions:

The open houses provided the opportunity for members of the public to interact with team members and decision makers as they craft this project. Interested participants took the opportunity to ask more in-depth questions regarding policy, procedure, timelines, and opportunities to remark on the draft EIS. Many members of the public were extremely knowledgeable and well informed on fire recovery and the potential effects of various parts of the preliminary proposed action and alternatives. At each open house, most notably at Sawyers Bar, there were a number of thoughtful and well-rounded discussions of strategic fuel breaks, fuels reduction strategies, restoration actions and other important questions.

There is broad consensus on post fire work on:

- roadside safety along main and important travel ways;
- defensible space around private property;
- strategic ridgetop fuel breaks; and
- fuels reduction (so that fire can be reintroduced on the Forest, and that future fires are less intense and less impacting on local communities and national forest resources).

The question of salvage of fire-killed trees generated widely diverse views including:

- Salvage as a means of fuels reduction had strong support from some parties, but less so from others.
- A common theme from supporters of salvage as a means to reduce fuels and recover economic value was to maximize the amount salvaged. Several residents of affected communities felt that an even more aggressive approach needed to be taken with the removal of the burned timber to reduce future fuel loads. The need to address the fuel loading that will increase over the next five to seven years in the post-fire area was a major topic of concern especially in and around the wildland urban interface communities. This particular subject area was an urgent theme in areas that had been evacuated in the past or during the 2014 fire season.
- Many local attendees stressed that recovery of economic value was important, particularly if it paid for future restoration, and that economic recovery should be maximized.
- Some parties felt that fire-killed trees should only be salvaged if they presented a safety hazard along main roads or posed a fuels risk to local communities, and that burned areas should otherwise not be salvaged.
- Reforestation of fire damaged sites also raised many opinions and concerns:
- Nearly all commenters on this topic wanted to make sure that species selection for reforestation was appropriate for the site in question, and that a mix of species should be planted. Several commenters noted that hot, dry south slopes and rocky sites that would not support coniferous forests should not be replanted with conifers.
- Several commenters noted that any replanting needed to be widely spaced rather than densely stocked plantations.
- Some commenters felt that planting trees was a poor investment in many cases, and that most sites should be allowed to re-vegetate naturally.

Ongoing Collaborative Efforts

The Siskiyou County Board of Supervisors and the Westside Klamath Steering Group, associated with the National Institute for the Elimination of Catastrophic Wildfire, have formed collaborative groups comprising residents of Siskiyou County and stakeholders for the purpose of providing information and comment to the Forest Service in support of the Westside Fire Recovery project EIS. The Westside Klamath Steering Group is a collective within Siskiyou County with a vested interest in the Westside Fire Recovery project's positive balance between healthy forests, wildlife, fisheries, and community protection. The group has expressed an interest in the restoration project, its impact on the socioeconomic issues, its progression and hopes to inform the Forest on the perceived priorities of the communities as they relate to the project. A particular interest of the Westside Steering Group is the long-term impact of the fire on potential timber receipts to Siskiyou County. The collaborative group authorized by Siskiyou County had not yet convened as of the publication of the draft EIS.

With publication of the draft EIS and subsequent project open houses, field trips and other meetings, the Klamath National Forest will be providing information to these collaborative groups as well as any other interested party. Their comments and recommendations, as well as those of other interest groups and the public at large, will be considered in development of the final EIS and Record of Decision.

Ongoing Tribal Consultation

The Klamath National Forest has also opened discussions with federally recognized tribes. On October 8, 2014, the Forest Service sent letters to federally recognized tribes, initiating consultation on the Westside Fire Recovery project with the Confederated Tribes of the Grand Ronde, Confederated Tribes of the Siletz, Karuk Tribe, Klamath Tribes, and the Quartz Valley Indian Reservation. The Karuk Tribe and the Quartz Valley Indian Reservation provided formal responses on November 14 and October 22, respectively. Comments from both tribes were incorporated into project alternatives.

On November 20, 2014, the Forest Supervisor and other forest representatives met with Quartz Valley Tribal Chair Harold Bennett and members of his staff. Impacts to fisheries, and contemporary traditional uses and subsistence were the focus of project concerns. Project information is passing between forest staff and Quartz Valley Indian Reservation staff, and an upcoming field trip scheduled in March will provide an opportunity to discuss the project in more detail.

Forest line officers presented an overview of the project to the Karuk Resource Advisory Board and tribal council members Josh Saxon and Bud Johnson on November 5; and briefly discussed the project at the Summit Meeting with the Karuk Tribal Council on November 12. The main project concerns raised at these meetings included taking a landscape-level look, the economics of salvage logging, getting fire back into the forest, and limiting planting. The Forest Supervisor met with the Tribal Council on February 19, 2015 to discuss concerns the Karuk had regarding consultation on the project and how the Karuk would like consultation to proceed. Everyone agreed that weekly project meetings would be beneficial. On February 24, the Forest Supervisor and Forest representatives presented the project in detail to Department of Natural Resources staff and tribal council member Josh Saxon. One of the main concerns voiced at this meeting was that the Forest needs to commit to restoration activities post-salvage (e.g., prescribed fire), as this is the piece that historically is not implemented. Weekly meetings with Forest line officers and staff, and Karuk Department of Natural Resources staff and council members are occurring every Monday. Staff to staff informational sharing is also occurring on a regular basis.

Preliminary maps of the proposed action and alternatives were provided to the Karuk Tribe prior to release of the draft EIS.

Upcoming Public Engagement

The Forest will be hosting series of public open houses during the comment period in the local communities. Announcements will be forthcoming and public engagement is encouraged. Presentations will be provided to groups upon request.

Ongoing Regulatory Consultation

The Forest has been actively consulting with regulatory agencies as well as local and national elected officials. The Forest is developing a project-specific programmatic agreement with the State Historic Preservation Office for compliance with the National Historic Preservation Act. Regarding the Endangered Species Act (ESA), the Forest is consulting and conferencing with the U.S. Fish and Wildlife Service about the effects of the project on the ESA-listed northern spotted owl and ESA listing candidate Pacific fisher, respectively. The Forest is also consulting with National Oceanic and Atmospheric Administration, National Marine Fisheries Service (NOAA Fisheries or NFMS) about the effects of the project on the ESA-listed Coho Salmon. The Forest is also working up-front with the North Coast Regional Water Quality Control Board regarding compliance with the Clean Water Act. The Forest will continue consultation efforts with all parties to ensure there is a full understanding of the project and that the resource needs of these groups are recognized and addressed.

Issues

Scoping comments from the public, other agencies, and tribes were used to formulate issues concerning the proposed action. The Forest Service separated the issues into two groups: relevant issues and other issues. Relevant issues were defined as those directly or indirectly caused by implementing the proposed action. Other issues were identified as those: 1) outside the scope of the proposed action; 2) already decided by law, regulation, Forest Plan, or other higher level decision; 3) irrelevant to the decision to be made; or 4) conjectural and not supported by scientific or factual evidence. The Council on Environmental Quality NEPA regulations explain this delineation in Sec. 1501.7: "…identify and eliminate from detailed study the issues which are not significant or which have been covered by prior environmental review (Sec. 1506.3)…"

The Forest Service received 749 unique comments by means of 98 unique letters, and 1,556 form letters during the scoping period. Scoping comments are summarized in appendix B. Four issues were determined to be relevant to alternative development or modification and are described in Table 1-7.

Table 1-7: Relevant issues and how they were addressed in project design

Relevant Issue #1.	***There is a disagreement about effects of salvage logging on wildlife habitat (e.g. northern spotted owl, Pacific fisher, and snag-associated species) and general wildlife habitat fragmentation and connectivity.***

	Alternative 2 responds to this issue. Following scoping the proposed action was refined to remove treatment in northern spotted owl cores classified as high potential for reproduction. Units that intersected these cores were removed from salvage harvest treatment. Criteria was clarified to include only areas of moderate to high severity vegetation mortality with more than ten contiguous acres of medium to high severity vegetation mortality and less than 40 percent crown closure to avoid habitat fragmentation and address concerns about connectivity. Alternative 3 responds to this issue by removing treatment in salvage harvest units classified as moderate potential for northern spotted owl reproduction. Moderate ranked core areas were identified at an owl home range scale. Salvage harvest units were also removed from treatment if they were less than 20 acres in size to avoid habitat fragmentation and address concerns about connectivity. This alternative also removes salvage treatments in units located in the Beaver project area in order to retain fisher connectivity in Beaver Creek. Fisher habitat will be protected by not removing large decadent hardwoods with cavities, selecting Douglas-fir and ponderosa pine snags over true fir snags where possible, and retaining snags within or adjacent to unique landscape features such as rock outcroppings, seeps, and springs. The following project design features were developed or modified following scoping to address this issue: Wildlife-11, 12, 18, 19, 20, 21
***Relevant Issue #2*.**	***There is a disagreement about the effects of salvage logging and required infrastructure on watershed health (e.g. beneficial uses, Coho Salmon habitat, and soil productivity).***
	Alternative 4 responds to this issue by identifying key watersheds and proposing to treat these watersheds differently to account for the specific conditions, water quality and fish habitat impairments, and recovery potential of each. Alternative 4 would reduce the ground disturbance-related impacts in these areas by eliminating temporary road actions (except for less than 250 feet stretches of temporary road on ridgetops). This alternative also includes restorative actions within riparian reserves where they occur within salvage harvest units, eliminates hazard tree removal on Maintenance Level 1 roads that are not used by the project, and allows for no landing construction within riparian reserves. The following project design feature was developed or modified following scoping to address this issue: Watershed-5
***Relevant Issue #3*.**	***There is a disagreement about the effects of salvage logging and site preparation on late successional reserves and riparian reserves.***
	Alternative 2 responds to this issue following scoping by clarifying that salvage harvest treatments are not proposed in any riparian reserves associated with stream channels or in hydrologic riparian reserves. Site preparation was modified after scoping to include hand treatment only in riparian reserves within plantation site preparation and planting units. Treatment will include hand-work only (no ground-based equipment) and lop-and-scatter or other fuels reduction will be implemented if fuel loading is above seven tons per acre; fuels may be hand-piled or windrowed and burned. Alternatives 3 and 4 respond to this issue (see description of how these alternatives address relevant issues #1 and #2. Alternative 5 responds to this issue because it proposes only treatment in units within matrix lands and removes salvage harvest and site preparation from all riparian reserves and late successional reserve management areas.
***Relevant Issue #4*.**	***There is a disagreement about whether or not the proposed action sufficiently reduces fuels adjacent to private timber lands in the Beaver Fire area.***
	Alternative 5 responds to this issue by including treatments on an additional 1,200 acres adjoining private land to increase fuel breaks along ridge and road systems within the Beaver Fire area. Units were identified based on proximity to private timberlands and the concept of connecting fuel treatments utilizing an "all-lands" approach. These additional hazardous fuels treatments in coordination with salvage harvest will reduce high densities of snags and surface fuels adjacent to private timberlands. .

Other Issues

Other issues were raised by the public that are being addressed by alternative 1 (no action), alternative 2 (the refined proposed action), and/or are being handled through responses to public comment.

Other Issue #1. **There is a disagreement about:**

a) where salvage logging should be proposed (in low to moderate fire severity, where fires were ignited from below);

b) what trees will be identified for removal;

c) what the effects will be on natural growth of plants and natural fire regimes (including risks of high intensity wildfire, and culturally-important plants) and roadless area characteristics; and

d) what the cumulative effects of the project will be added to the effects of other projects.

Other Issue #2. **There is a disagreement about the economic effects of the project:**

a) whether enough trees will be salvage logged to provide economic benefits;

b) how limited operating periods will limit economic opportunities; and

c) whether the true environmental economic costs will be analyzed.

Other Issue #3. **There is a disagreement about the effects on safety and the environment from the number and criteria for choosing trees to be removed through roadside hazard treatments:**

a) how many trees need be removed to provide safe travel along roads; and

b) how removing hazard trees, especially below roads, affects safety.

Other Issue #4. **There is a disagreement about the species and density of trees proposed for planting and the costs and benefits of reforestation through planting.**

Other Issue #5 **There is a disagreement about the environmental costs and benefits of the project to:**

a) air quality;

b) climate change;

c) cultural resources;

d) economics;

e) forest health;

f) fire and fuels;

g) invasive species (noxious weeds); and

h) recreation and scenery;

i) soils, geology, and watershed protection;

j) vegetation, especially the timber resource;

k) wildlife species and habitat (especially snag-associated species).

Chapter 2 Alternatives, Including the Refined Proposed Action

Introduction

This chapter describes and compares the alternatives considered for the Westside Fire Recovery project. It describes both alternatives considered in detail and those eliminated from detailed study. The end of this chapter presents the alternatives in tabular format so that the alternatives and their environmental impacts can be readily compared.

Best Available Information and Data Quality

This draft EIS was prepared using a combination of remote sensing analysis tools such as the Rapid Assessment of Vegetation Condition after Wildfire (RAVG), soil burn severity assessments, standard Geographic Information System (GIS) spatial data, forest vegetation and transportation databases, and field verification of on-the-ground conditions. Every stand, site preparation unit, fuel break etc. has been visited in the field to make this draft EIS as accurate as possible. Mapping for publication of the draft EIS of proposed salvage units and site preparation and planting units is based on RAVG assessments of fire severity, Forest GIS databases and field verification. Additional data collection, field verification and data refinement will occur before publication of the final EIS. Model outputs will be adjusted as appropriate. Unit boundaries, treatment acres and analysis of effects may change based on updated surveys and additional field reconnaissance. Those changes will be incorporated into the final EIS.

Alternatives Considered in Detail

Based on the issues identified through public comment on the proposed action, the Forest Service developed 14 alternatives to the proposed action, four of which were designed to achieve the purpose and need and were studied in detail. In addition, the Forest Service is required to analyze a no action alternative. The no action alternative, proposed action, and other alternatives studied in detail are described below.

In addition to the 14 alternatives developed, the Forest Service received an alternative from the Karuk Tribe on March 5, 2015 at 4:30 pm, the day before printing; it has been incorporated into appendix G of the DEIS and is available for public review and comment. For the final EIS and for consideration in the decision, the Forest Service may likely produce another alternative to be analyzed in detailed study. This alternative would be reflective of ideas raised during the public comment period, collaborative efforts, and consultation. It would be comprised of actions already proposed among the existing action alternatives. Actions would be within the range of alternatives already proposed and their effects would be within the scope of analysis already considered in this draft EIS.

Alternative 1

This is the no action alternative; there will be no treatment with this alternative. The no action alternative provides reviewers a baseline to compare the magnitude of environmental effects of the action alternatives. It also provides a picture of the results of allowing natural regeneration to take place across the project area.

Alternative 2

Alternative 2 is the refined proposed action and the preferred alternative. Refinements are based on public comments received and acquisition of detailed information regarding the project area. Acres by treatment type are described in detail below and do not account for the overlap in treatment types. This project includes the following four types of treatments: (1) salvage; (2) roadside hazard treatments; (3) hazardous fuel treatments; and (4) site preparation, planting, and release.

Connected actions are also described as part of alternative 2; included in this description are existing legacy sediment sites that were identified and will be scheduled for treatment in compliance with the Clean Water Act as a condition of the North Coast Regional Water Quality Control Board waiver of waste discharge requirements (Order No. R1-2010-0029). Legacy site work needed on the Salmon/Scott River Ranger District is covered under previous NEPA documents and will not be discussed as part of this alternative.

Salvage Harvest (about 6,800 treatment acres within 11,700 acres of units)

Proposed salvage logging treatments on approximately 6,800 acres within about 11,700 acres of salvage units on Forest lands will reduce safety hazards, promoting the successful protection of the public and forest workers (table 2-1). Snag removal from around local communities, key infrastructure, and roads will provide fire managers improved options for effectively managing potential future wildfires. Incorporated into the proposed action are project design features with the intent of protecting and promoting late successional habitat, consistent with the Forest Plan. Salvage logging will promote ecosystem sustainability by increasing the likelihood and speed by which burned forested areas are reforested following the fires by opening areas up for safe planting and by reducing large-log fuel loads. Although fire plays an important role in the ecosystem, reducing these fuel loadings minimizes the intensity and severity of future fires; thereby, decreasing the potential for losing wildlife habitat from future fires and improving the likelihood of firefighting success.

Criteria used to consider areas for salvage harvest treatments include:

- No salvage harvest is proposed within wilderness, backcountry, research natural areas, designated or recommended wild rivers, inventoried roadless areas, or riparian reserves associated with stream channels (hydrologic riparian reserves) or high ranked northern spotted owl cores in the project area.[18]
- Areas proposed for treatment include only:

[18] This refers to hydrologic not geologic riparian reserves. Treatment is proposed in geologic riparian reserves. Riparian reserves will likely need to be crossed to access certain harvest stands.

4. Areas of moderate to high severity vegetation mortality with more than 10 contiguous acres of medium to high severity vegetation mortality and less than 40 percent crown closure;
5. Areas determined to be feasible in terms of logging systems, accessibility, and economics; and
6. Units outside of northern spotted owl core areas that have more than 50% effective nesting, roosting or foraging habitat remaining within the core area.

In determining what individual trees will be harvested, standing dead trees 14 inches in diameter at breast height or greater will be considered for salvage using the guidelines in Report #RO-11-01 "*Marking Guidelines for Fire-Injured Trees in California*" (Smith & Cluck, 2011) to identify trees for removal. These guidelines were developed using peer-reviewed scientific literature to evaluate tree species in northern California for mortality. The guidelines provide a sliding scale of the probability for tree mortality based on percent volume or length of crown scorched by fire. The responsible official has chosen to salvage trees with a 70 percent or greater chance of dying within the next three to five years. It is anticipated a majority of trees within salvage units will be harvested, as most burned with high severity and have a high probability of mortality.

Recommendations identified in the Late Successional Reserve Forest-wide Assessment (USDA 1999) follow Forest Plan direction focusing on long-range objectives and direct management actions following a stand-replacing event to be designed to accelerate or not impede the development of late-successional characteristics. Management direction for salvage in late successional reserves (Forest Plan, pages 4-87 through 4-88) will be followed. Project design features are incorporated into the project design, as described in chapter 2.

Salvage logging treatments will be accomplished by a combination of ground-based, skyline, and helicopter logging systems (Table 2-1). All salvage units will be reforested (see reforestation section below) with the need for site-preparation evaluated per criteria outlined in site-preparation section below.

Table 2-1: Acres of salvage harvest treatment within units by logging system

Logging System	Beaver Fire	Happy Camp Complex	Whites Fire	Grand Total
	Acres of Treatment[a] within (Unit)[b]			
Ground-based	420 (660)	410 (690)	20 (40)	850 (1,390)
Skyline	80 (200)	3,100 (4,900)	140 (280)	3,320 (5,380)
Helicopter	0	2,360 (4,400)	280 (540)	2,640 (4,940)
Total Treatment (Unit)	**500 (860)**	**5,870 (9,990)**	**440 (860)**	**6,800 (11,700)**

[a] Treatments are estimated acres within units where more than 50% mortality occurred and where salvage activity is proposed. Treatment areas avoid riparian reserves and areas where less than 50% mortality occurred.
[b] Units are larger than treatment areas because they include salvage harvest acres, as well as areas where no harvest will occur such as riparian reserves and areas with less than 50% mortality that are within unit boundaries.
[c] Acres are estimates based on GIS and field data. Values are rounded to the nearest ten acres for individual treatment methods (skyline etc.) and to the nearest 100 acres for estimates of total treatment acres by alternative.

Maps showing areas considered for treatment are found in appendix A. Acres considered for salvage harvest treatments are described in table 2-2.

Table 2-2: Acres of salvage harvest units by land allocation

Salvage Harvest by Management Area	Beaver Fire	Happy Camp Complex	Whites Fire	Total Acres [a]
General Forest	460	610	0	1070
Partial Retention VQO	130	1090	10	1230
Recreational River	0	120	30	150
Retention VQO	0	190	0	190
Riparian Area	180	560	30	770
Special Habitat, LSR	90	6680	790	7560
Special Habitat, T&E Species	0	740	0	740
Grand Total (acres)	**860**	**9990**	**860**	**11710**

[a] Acres are estimates based on GIS and field data. Values are rounded to the nearest ten acres for individual treatment methods (skyline etc.) and to the nearest 100 acres for estimates of total treatment acres by alternative.

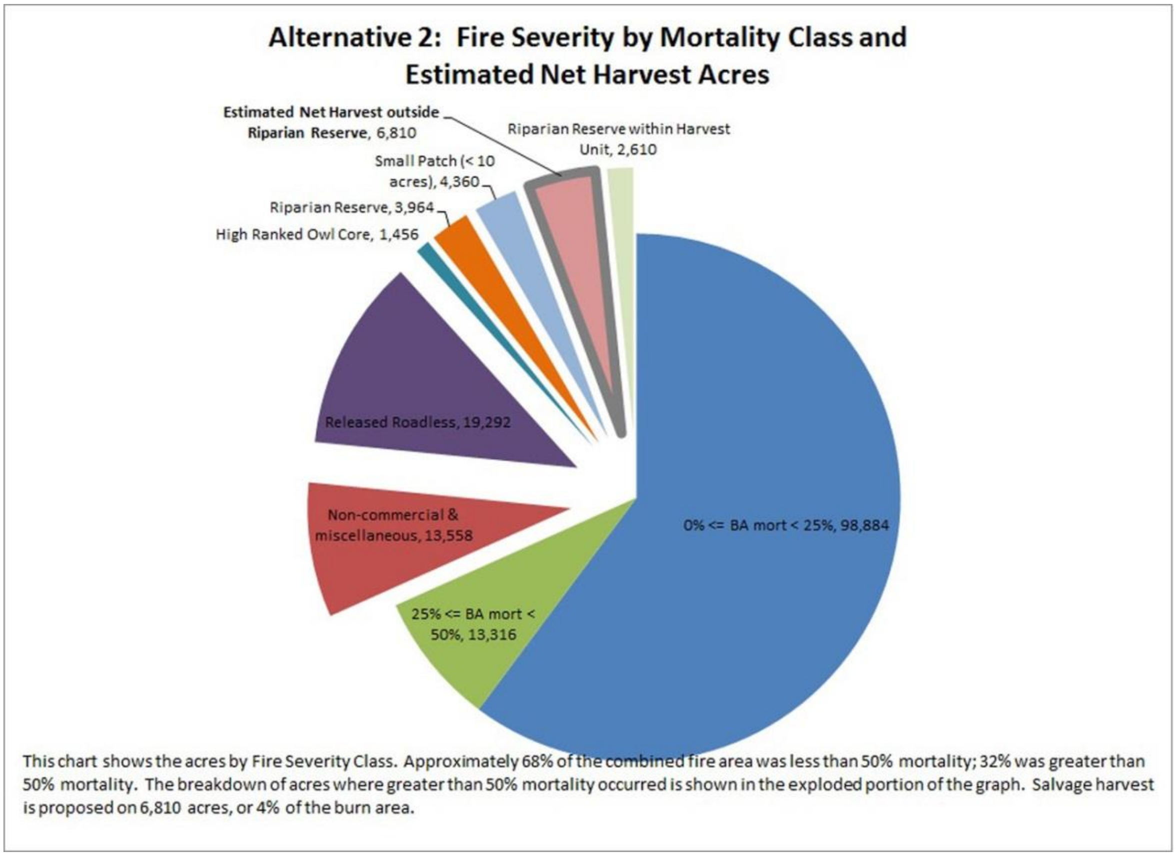

Figure 2-1: Fire Severity by Mortality Class and Estimated Net Harvest Acres

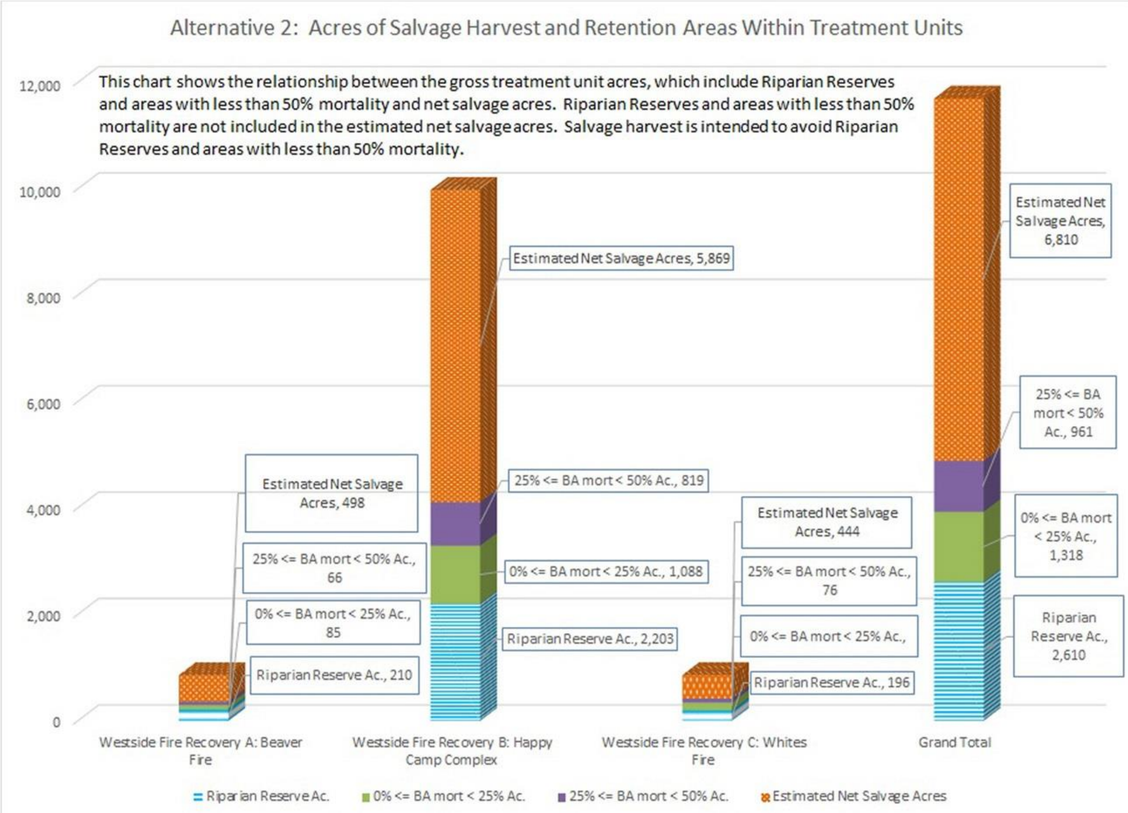

Figure 2-2: Acres of Salvage Harvest and Retention Areas within Alternative 2 Treatment Units

Roadside Hazard Treatments (650 miles)

The Forest Service will identify and remove hazard trees along about 650 miles of National Forest Transportation System roads, county roads, and state highways. Roadside hazard reduction (removal of fire-killed trees) is proposed within 250 feet on either side of selected roads to address hazards. A hazard, or danger, tree is defined as a standing tree that presents a hazard to people due to conditions such as deterioration of or damage to the root system, trunk, stem, or limbs or the direction or lean of the tree (29 CFR 1910.266(c); FSH 6709.11, glossary). Because of slope, a few fire-killed trees farther than 250 feet from a road may still present a hazard to the road and thus need to be removed, but the majority of hazard trees will be within the 250-foot buffer. Roadside hazard treatments will include the use of ground-based, skyline, and helicopter logging systems.

To provide for both public and Forest worker safety and future fire suppression efforts, roads classified in all maintenance levels will be considered for roadside hazard treatments. Only hazard trees identified by the criteria below will be removed. Where no hazard trees are present, there will be no hazard tree removal.

The actual area where harvest will occur will not be known until hazard tree evaluations are completed. Mileages of treatment proposed are a maximum; the numbers are merely representative of the entire length and area being evaluated for hazard tree identification and removal. Acres used for analysis were calculated using all fire severity classes with a 200 foot buffer[19] on either side of affected roads. GIS was used to narrow down the amount of acres of roadside hazard considered for hazard tree removal. As a result, the area actually treated by roadside salvage will likely be smaller than the estimated 20,500 acres. Of those 20,500 acres, approximately 16,600 acres are coniferous forest; 660 acres are hardwood forest and about 3,250 are shrubs and brush or are not vegetated. For conifer and mixed conifer forests, diameter ranges were broken into three categories: (1) up to ten inches (6,200 acres), (2) ten to 20 inches (4,700 acres), and (3) greater than 20 inches in diameter at breast height (5,700 acres). Of the hardwood stands (660 acres) 630 acres were with tree diameters less than 20 inches; approximately 30 acres were with tree diameters greater than 20 inches.

All Forest Service system roads within the project boundary will be evaluated for roadside hazard tree identification and removal. This includes maintenance level one roads used by Forest Service employees and contractors for administrative purposes. Current hazard trees (also known as danger trees) will be identified using the Regional Hazard Tree Guidelines for Forest Service Facilities and Roads in the Pacific Southwest Region (Angwin et al. 2012). In addition, all trees burned in the 2014 fires along Forest Service system roads within the project area will be considered for removal if they have a 60 percent or greater chance of dying within three to five years as defined by Report #RO-11-01 “Marking Guidelines for Fire-Injured Trees in California” (Smith & Cluck, 2011) in order to capture future hazard trees.

All trees identified as hazard trees regardless of size class will be cut along all system roadways. All merchantable trees will be removed when consistent with project design features. Non-merchantable trees will be piled and burned where the treatment is along a strategic road for hazardous fuels treatments, described below. Non-merchantable trees will be cut and left when they are not along a strategic road for fuel treatments. Per agency policy already in place, the public may obtain a fuelwood permit to remove felled trees for firewood in accordance with permit requirements. The agency anticipates the local public will remove firewood along roadways, especially near communities.

Where there is overlap with salvage treatment units, both hazard trees and those trees fitting the salvage harvest prescriptions will be cut and removed in accordance with project design features.

The removal of merchantable roadside hazard trees will be accomplished by a combination of ground-based, skyline, and helicopter logging systems.

Miles by maintenance level considered for roadside hazard treatments are described in Table 2-3. Acres by management area considered for roadside hazard treatments are described in Table 2-4. Maps showing areas considered for roadside hazard treatment are found in appendix A.

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[19] Hazard tree removal is proposed within 250 feet on either side of selected roads. Topographic breaks and unstocked areas without hazard trees will reduce the actual treated acres. For the purposes of analysis, a 200 foot buffer was used to estimate the acres where treatment may occur.

Table 2-3: Miles of Roadside Hazard Treatments by National Forest Transportation System maintenance level

Road Type by Maintenance Level	Beaver Fire	Happy Camp Complex	Whites Fire	Grand Total
Level 1 (basic custodial care, closed to public)	17	49	3	69
Level 2 (high clearance vehicles)	66	183	31	280
Level 3 (suitable for passenger cars)	30	67	15	112
Level 4 (moderate degree of user comfort)	2	7	0	9
Level 5 (high degree of user comfort)	2	0	0	2
County Roads and State Highways	49	96	27	172
Grand Total (miles)	**166**	**402**	**76**	**644**

Table 2-4: Acres of Roadside Hazard Treatments considered by management area.

Road Type by Management Area	Beaver Fire	Happy Camp Complex	Whites Fire	Grand Total
General Forest	1,126	1,129	0	2,255
Partial Retention VQO	795	2,781	2	3,578
Recreational River	0	220	48	268
Retention VQO	26	211	0	237
Riparian Area	1,025	2,062	247	3,334
Scenic River	0	64	0	64
Special Habitat, LSR	135	8,086	2,409	10,630
Special Habitat, T&E Species	0	121	0	121
Grand Total (acres)	**3,107**	**14,674**	**2,706**	**20,487**

Hazardous Fuels Treatments (22,900 acres)

In addition to the salvage harvest, roadside hazard treatments, and site preparation treatments described in this alternative, hazardous fuel treatments will further reduce the dangers associated with heavy fuel loading, especially within the wildland urban interface. The Forest Service will treat hazardous fuels on about 22,900 acres of Forest lands. Fuels treatments were developed using the criteria listed below and include: lop and scattering, chipping, broadcast burning, jackpot burning, and pile burning.

Site preparation in units where planting is proposed will also reduce fuel loadings. In order to maintain desired conditions of surface, canopy and ladder fuels, follow up maintenance will also occur where strategic ridge- and road-systems intersect units proposed for site preparation and planting. Maintenance will involve thinning of understory vegetation and piling of surface fuels to maintain desired fuel conditions. Conifer trees up to 12 inches in diameter may be cut and the retained trees pruned to increase canopy base heights in order to decrease fire behavior at the surface and transition to over-story fuels (see description of site-preparation below).

No fuels treatment will occur within wilderness, research natural area, or wild river land allocations. Hazardous fuels treatments may occur in both hydrologic and geologic riparian reserves. Table 2-5 describes the acres of hazardous fuels treatments by land allocation.

Table 2-5: Acres of hazardous fuels treatments by management area.

Management Area	Beaver Fire	Happy Camp Complex	Whites Fire	Grand Total
General Forest (MA17)	248	319	259	826
Partial Retention VQO (MA15)	993	2,156	1,868	5,017
Recreational River (MA13)	0	343	518	861
Retention VQO (MA11)	288	670	1	959
Riparian Area (MA10)	468	1,748	1,520	3,736
Scenic River (MA12)	0	43	0	43
Special Habitat, LSR (MA5)	31	3,300	6,835	10,166
Special Habitat, Eagle/Falcon (MA5)	0	161	0	161
Total Hazardous Fuels Treatment (acres)	**2028**	**8,740**	**11,001**	**21,769**

The following was used to evaluate and identify hazardous fuels treatments areas, and strategic roads and ridgelines:

- One-quarter mile of private property structures in burned areas or within areas that underwent fire suppression-related activity;
- 500 feet of infrastructure (e.g. utility lines, communication sites, campgrounds, lookouts, bridges, etc.);
- 250 feet on either side of Forest roads and ridgelines, used historically for fire suppression purposes; and
- Only areas determined to be feasible in terms of slope, accessibility, existing fuels conditions, and logical holding features such as roads, streams, and ridges.

Maps showing hazardous fuels treatments are found in appendix B; detailed tables by prescription are in appendix F. Acres of treatment for hazardous fuel treatments are summarized Table 2-6.

Table 2-6: Acres of hazardous fuels treatment by treatment type

Fuels Treatment Type	Beaver Fire	Happy Camp Complex	Whites Fire	Grand Total
Wildland Urban Interface	613	1,197	413	2,223
Fuels Management Zones	866	3,024	917	4,807
Roadside Fuels Treatments	612	3,012	807	4,431
Prescribed Burn	0	1,556	9,870	11,426
Grand Total (acres)	**2091**	**8,789**	**12,007**	**22,887**

Information on fuels treatments in the wildland urban interface, fuel management zones, roadsides, as well as in areas proposed for prescribed burning and site preparation, are provided below.

Wildland Urban Interface (about 2,200 acres)

A combination of mechanical, mastication, and hand work is planned. Areas identified for treatment with mechanical equipment will include a combination of cutting dead trees less than 12 inches in diameter and other understory vegetation. After mechanical or mastication treatments, activity generated slash will be piled and burned. Areas treated only by hand thinning will remove dead vegetation or trees that will be disposed of by chipping, piling with follow-up burning, or lopping and scattering of fuels. Live understory vegetation (less than 12 inches in diameter) will be removed to reduce flame length, intensity, and the potential for crown fire activity. The objective is to have an area with a reduced fuel load and minimized ladder fuels to create a more defensible wildland urban interface during future fire events.

Fuels Management Zones (about 4,800 acres)

The primary locations of fuels management zones are strategic ridge systems used to contain the 2014 fires as well as historic fire lines from previous large fires within the project area. The treatments aim to maintain existing control lines by removing all dead vegetation, and live understory vegetation, along with live conifer trees less than 12 inches in diameter at breast height. Retained conifers will be pruned up to seven feet above the ground within these zones to increase canopy base height, and reduce ladder fuels and the potential for crown fire initiation. Activity-generated fuels will be disposed of by a variety of methods. Where hand thinning is proposed, lopping and scattering of fuels, piling and burning, and/or chipping will be used to reduce fuels. Mechanical or mastication equipment may be used to pile activity slash within these areas in addition to, or in lieu of, hand work.

Roadside Fuels Treatments (about 4,400 acres)

Roadside treatments identified as strategic for fuels reduction will assist with future locations to hold a planned or unplanned fire within the project area. Roadside treatments outside of identified strategic road systems will include hazard tree removal of activity-generated fuels to provide for access for fire suppression resources responding to future unplanned ignitions. Activities similar to those described above within fuels management zones will be used to treat roadside fuels.

Prescribed Burn (about 11,400 acres)

Prescribed fire implementation will occur under cool weather conditions which promote low intensity fires. A mosaic post-burn condition will exist with isolated pockets of tree mortality, and burned and unburned understory vegetation.

Second-entry burns in units identified for prescribed burning will be used to maintain surface fuel loading and increase heterogeneity of forest structure and vegetation by consuming surface fuels and small understory vegetation. A mosaic burn is anticipated where some areas fully consume surface fuels and other areas are partially burned or unburned. Many of the prescribed burning locations will use existing control lines established in recent large fires within the project area. Line construction activities will occur around the perimeter of the fire and will include using dozers to re-scrape control lines to mineral soil; where control lines are inaccessible for equipment, hand-line construction to mineral soil will occur. Removal of understory vegetation along control lines will include cutting brush and conifer trees less than 12 inches in diameter to facilitate holding operations during prescribed fire implementation.

Site Preparation, Planting, and Release

Site-preparation, planting, and release treatments are designed to increase the likelihood and speed by which burned forested areas are reforested following fires. More rapid and successful reforestation is accomplished by reducing fuel loading and creating openings for safe planting. Careful evaluations were made to prioritize treatment units likely to support successful reforestation. Units within the project area are highly variable, so criteria differ slightly for determining site-preparation needs within natural units versus existing plantations.

For the purposes of this project, reforestation needs were stratified into three categories for field evaluation: 1) burned conifer plantations; 2) conifer units proposed for salvage harvest; and 3) conifer units not proposed for salvage harvest for which there is a need to reforest with conifer species. Areas were considered for site preparation, planting and release if they:

- Were identified as areas determined to have been historically dominated by conifers, as determined by the 1945 Wieslander Vegetation mapping (Kelly, M.B. et. al 2005) in addition to visual cues based upon Forest Service professional judgment;
- Had successful vegetation growth before the 2014 fire;
- Had evidence that, prior to the fire, conifers were successfully re-establishing, and competing vegetation (brush and hardwoods) were not dominating the site;
- Had little availability of natural seed source within seed distribution distances;
- Had favorable site class, aspect, slope position, and elevation for artificial regeneration; and,
- Had favorable regeneration potential by prioritizing areas based on site quality and moisture availability and avoiding areas with a history of repetitive high severity burns if likely to re-burn before stand reaches level of fire resilience.

Site Preparation (about 12,656acres)

Site-preparation will increase the ability of planting units to become resilient and provide forested habitat in a fire-adapted ecosystem. Fuel loading after site preparation treatments will mimic that of natural stands and increase the ability of important components of units to survive the historic fire frequencies experienced in the project area. In addition to the site-preparation activities described under the hazardous fuels section above, depending on site location, site preparation will include the following treatments (see appendix A for maps of treatment locations):

- Manual site preparation will fall standing dead conifers, hardwoods, and brush less than ten inches diameter at breast height with a chainsaw or other cutting implement on slopes greater than 35 percent. Felled material will be piled or windrowed by hand and burned to complete site preparation activities. Material greater than ten inches in diameter will be left or skyline yarded on steep slopes because of concerns about safety and effectiveness of treating large, heavy material by hand on steep grounds.
- Skyline yarding will be used on slopes greater than 35 percent with high densities of dead trees. Trees generally less than 16 inches in diameter will be skyline yarded, decked or piled on roadside landings. Piled material may be made available to the public for firewood cutting. Pile burning will complete site preparation activities.
- Mastication will be used to shred dead trees, hardwoods and brush less than 12 inches in diameter into pieces less than three inches diameter distributing them across the unit on slopes less than 35 percent.
- Mechanical yarding and slash piling of dead trees generally less than 16 inches will be used on slopes less than 35 percent. These trees will be cut and piled

using ground-based equipment or cut and skidded to a landing where the material will be burned. Piled material of preferred firewood species may be made available to the public for firewood cutting following project activities.

- Following mechanical site preparation activities, units will be identified (Watershed-25 and Watershed-26, Table 2-35 of chapter 2) as areas where sub-soiling or deep tillage will be used to help break up the dense soil and improve infiltration, aeration, and tree growth. Ripping may also be considered to help mechanically break up soils by raking across unit contours. No sub-soiling, deep tillage, or ripping is proposed in riparian reserves.

Table 2-7: Site preparation by unit type

Treatment Unit Type	Beaver Fire	Happy Camp Complex	Whites Fire	Grand Total
Plantations	1,112	3,170	599	4,881
Within Natural Units (Non-salvage Harvested)	621	325	29	975
Within Salvage Harvest Units	500	5,870	440	6,800
Total Site Preparation Acres	**2,233**	**9,365**	**1068**	**12,656**

Plantations (about 4,900 acres)

Site-preparation in plantations includes plantations that existed prior to the 2014 fires where most of the unit was lost due to wildfire. Based on the criteria listed above, these plantations were also identified as unable to recover naturally. Most plantations planned for treatment consist of dead trees less than 16 inches in diameter at breast height. In some areas trees larger than 16 inches will be treated in order to reduce hazards to workers, the public, and reduce fuel loading to achieve flame lengths of less than four feet over the next 20 years.

Riparian reserves within the plantation site-preparation and planting units in the Whites Fire and Happy Camp Complex will be treated to achieve ground cover and allow for natural regeneration of vegetation. Treatment will be focused in areas of high and moderate vegetation mortality and where the overhead hazards can be mitigated without equipment entry into the riparian reserves. Trees up to 16 inches diameter at breast height in riparian reserves will be cut and felled. Treatment will include hand-work only (no ground-based equipment) and lop-and-scatter or other fuels reduction will be implemented if fuel loading is above seven tons per acre; fuels may be hand-piled or windrowed and burned.

Natural Units (Non-salvage Harvested, about 980 acres)

Natural units are units not scheduled for salvage harvest that were burned during the 2014 fires. They generally are units with trees generally less than 20 inches diameter at breast height. These units were assessed for reforestation using the criteria listed above. These units will only be treated where mitigation of the snag hazards can be completed prior to planting.

Table 2-8: Acres of site preparation, planting, and release by management areas for alternative 2 (does not include acres of site preparation, planting, and release in salvage harvest units)

Management Area	Beaver Fire	Happy Camp Complex	Whites Fire	Grand Total
General Forest (MA17)	502	637	0	1139
Partial Retention VQO (MA15)	870	1,149	0	2,019
Recreational River (MA13)	0	12	0	12
Retention VQO (MA11)	0	27	0	27
Riparian Area (MA10)	385	398	0	783
Scenic River (MA12)	0	0	0	0
Special Habitat, LSR (MA5)	16	3,222	638	3,876
Special Habitat, Eagle/Falcon (MA5)	0	26	0	26
Grand Total	**1773**	**5,471**	**638**	**7,882**

Salvage Harvest Units (about 6,800 acres)

Site-preparation for reforestation in salvage units will follow harvest activities. Site preparation will only be done where fuel loading after harvest is greater than seven tons per acre (including standing dead fuels). Otherwise, these units will be planted without site preparation.

Reforestation and Release (about 14,184 acres)

Within Plantations, Natural Units, and Salvage Harvest Units

Reforestation prescriptions are designed to reflect projected unit composition based on historic information; this condition includes hardwoods as well as conifers. Units identified for proposed planting include areas where no suitable green trees exist or the number of remaining green trees can’t provide a seed source for natural regeneration. Planting is proposed for areas where residual green trees were assessed during site visits for immediate seed-cone potential and were found to be inadequate for providing a reliable seed source. Remaining green trees will contribute to overall post-fire stocking levels but cannot be relied upon solely for overall re-seeding needs.

Planting prescriptions are based on historic unit conditions, projected unit composition, and the likelihood of long-term survivability of project units within a fire ecosystem. Overall, species considered for planting in the project area include Douglas-fir, sugar pine, ponderosa pine, incense cedar, white fir, and red fir. A mosaic distribution will be achieved over time due to the spatial variability achieved by micro-site selection for planting. Conifers will not be planted next to green hardwoods; these hardwoods will be included in average spacing. Seedlings will be widely spaced on poorer sites including southerly aspects and/or rocky soils. Trees will be planted in clusters to achieve groups of conifers throughout the landscape to mimic natural units. Seedling survival rates and competition from brush species will create a natural mosaic of species and stocking densities. In order to effectively reforest these units, an average of 130 to 300 trees per acre will be planted to achieve acceptable levels of stocking, depending on the site conditions described below. Initial planting spacing recommendations considered Forest Plan land management objectives for projected stocking needs, and the likelihood of achieving those objectives, for each unit evaluated for reforestation.

Tree planting (or reforestation) will be by hand methods, using either bare root or container stock. Hand planting will increase the likelihood for survival and provide for the desired spatial variability within treatment units and across the project area. Tree species used for planting will roughly correspond with historical unit composition, varying by forest type from unit to unit. In general, mostly pines will be planted on droughty south-facing slopes and ridges. South-facing slopes and ridges will be planted at lower densities compared to other areas within the project area. Douglas-fir will be planted at higher densities as the primary species on lower sheltered slopes and northern aspects. True fir will be re-established at the higher elevations at the highest density to reflect how these units would have naturally established. Hardwoods will not be planted, due to their ability to naturally regenerate following fire either by epimoric sprouting, belowground sprouting, or by natural re-establishment as seedlings from seed caches found within the stand. Epimoric sprouting refers to the shoots that grow from buds on stems or branches of hardwoods, often in response to stress. Growth of existing hardwoods will be encouraged; hardwoods will be included in the target stocking for units in areas where they exist.

Additional planting establishment techniques may be used to increase survival of planted trees. These techniques include, but are not limited to: animal protection devices for browse reduction; shade blocks for improved microsite conditions; and hand grubbing to remove competing vegetation around seedlings for survival.

Release

The release treatment will follow planting or natural regeneration to increase the establishment of conifer seedlings. Release treatments include manually removing competing plants or water uptake from competing plant roots by “grubbing” around conifer seedlings or natural hardwood seedlings. Grubbing consists of removing all vegetation within a minimum of a five foot radius from planted or natural regenerated seedlings.

Table 2-9: Acres of reforestation and release by unit type

Treatment Unit Type	Beaver Fire	Happy Camp Complex	Whites Fire	Grand Total
Plantations	843	4,988	563	6,394
Within Natural Units (Non-salvage Harvested)	564	397	29	990
Within Salvage Harvest Units	500	5,870	440	6,800
Total Reforestation/Release	**1907**	**11,255**	**1032**	**14,184**

Connected Actions

Road Access

Project access will require the use of about 562 miles of National Forest Transportation System roads and county roads. System roads will be maintained as needed for project implementation as displayed in Table 2-10. There will be no roads added to the National Forest Transportation System as a result of this project; about five miles of new temporary roads will be constructed and about 19 miles of temporary roads on existing roadbeds will be used for project access. Ten miles of those 19 miles of temporary roads on existing roadbeds are proposed reopening of previously decommissioned roads. All temporary roads will be closed and hydrologically stabilized according to the project design features (Watershed-5 and Watershed-24) found later in chapter 2.

Table 2-10: Miles of road access by Forest Transportation System maintenance level and temporary road access

Type of Road Access	Beaver Fire	Happy Camp Complex	Whites Fire	Grand Total
Forest System, County, and State	**146**	**353**	**63**	**562**
New Temporary	**0**	**4**	**1**	**5**
Existing Temporary				
Temporary Road on Existing	3	6	1	10
Re-open Decommissioned	0	9	0	9
Total Existing Temporary	**3**	**15**	**1**	**19**
Grand Total	**149**	**371**	**65**	**585**

Landings

Existing landings will be used where possible. Landing size will be commensurate with operational safety. Helicopter landings will be up to two acres in size. Skyline landings will use roads wherever possible. New skyline landings off the road system and ground-based landings will average one acre in size but will not exceed 1.5 acres in size. Both new and existing landings will be hydrologically stabilized after use, according to the project design features (Watershed-5 and Watershed-24) found later in chapter 2.

Legacy Sites

The portion of Elk Creek within the project area contains about 148 legacy sites. Most of the legacy sites are located on or adjacent to the Forest transportation system. The other legacy sites are located on existing landings or roadbeds (historic roads, abandoned temporary roads, or decommissioned roads). Legacy site treatments are shown in map A-29 in appendix A and will include the treatments shown in Table 2-11.

Table 2-11: Description of treatment, number of sites, and actions needed for legacy site treatment

Treatment	Number of Sites	Description of Action Needed:
Culvert Upgrades	About 45	Replace culverts to accommodate the 100-year peak flow.
Diversion Prevention	About 51 sites (17 included in culvert upgrade)	Construct armored rolling dips to prevent streams from diverting down roadways should the culvert plug or fail.
Aquatic Organism Passage	3 sites	Replace existing stream crossing with bottomless arch culvert to improve or restore aquatic organism passage.
Retaining Wall	About 7 sites	Construct retaining wall, rock buttress, reinforced embankment, or equivalent. Where road prism has slumped or failed.
Fill Reduction	About 16 sites	Remove excess fill materials from the top of stream crossings to reduce the amount of fill available for discharge should the culvert plug or fail; add riprap to armor fill slopes.
Fill Removal	About 27 sites	Remove all fill materials from stream channels, swales, road shoulders and sliver fills; these treatments would occur on closed Forest roads and existing roadbeds.
Repair/Maintain Existing Infrastructure	About 16 sites	Clean culvert inlets, ditches, etc., repair damaged culvert inlets, shorten “shotgun” culvert outlets, place riprap below culvert outlets to reduce hill slope erosion, remove cut slope slide materials

Road storm-proofing treatments between individual sites will occur on about 33 miles of Forest system roads (15N02, 15N75, 16N05, 16N39 and 45N19). Treatments between legacy sites may include the following: where possible reconstruct road prism to an out sloped configuration, otherwise reduce inboard ditch length by adding additional relief culverts or dips; reduce road prism width; remove berms; place rip-rap below outlets of ditch relief culverts; recondition road subgrade and travel surface - apply crushed aggregate; add rolling dips where needed to control road surface runoff; stabilize road prism slumps with retaining walls or rock buttresses.

Alternative 3

Alternative 3 was developed in response to relevant issues one and three and public comments raised about the effects of the proposed action on spotted owl and fisher habitat, habitat connectivity, and legacy components. Legacy components are those habitat features that take a long time to develop (e.g. large old-growth trees, legacy trees, and large downed logs). Alternative 3 emphasizes the development of future late successional habitat, habitat connectivity, northern spotted owl habitat and retention of legacy components within the post-fire landscape.

Spotted owl activity centers within the project area were evaluated and prioritized in order to identify sites with the highest likelihood of occupancy post-fire. In order to more fully respond to recommendations described in Recovery Action 10 of the 2012 Revised Recovery Plan, known spotted owl activity centers in the project area were evaluated based on the amount of suitable habitat remaining post-fire within the 0.5 mile core areas (500 acre areas centered on clusters of best available locations such as known nest and roost sites). Activity centers containing at least 50 percent (250 acres) suitable nesting/roosting and/or foraging habitat within the core area and an additional 1,086 acres nesting/roosting and/or foraging habitat in the outer home range (0.5 to 1.3 miles) were classified as having “high potential” for the owls associated with that site to remain on site, continue to reproduce, and therefore contribute to the demographics of the spotted owl population in the area.

Activity centers containing less than 50 percent suitable nesting/roosting and/or foraging habitat within the core area were evaluated at the 1.3 mile home range scale. Home ranges containing more than 20 percent suitable nesting/roosting and/or foraging habitat were classified as having “moderate potential” for the owls associated with that site to remain on site, reproduce, and contribute to the demographics of the population in the area. The Level One consultation team acknowledged uncertainty in site location but assumed that shifts in locations could occur in response to the modifications and/or loss of habitat caused by high and moderate severity fire. Those with “moderate potential” may shift away from their original core use area, but remain within their home range in areas where adequate suitable habitat exists post-fire.

Low potential sites were defined as having less than 20 percent suitable habitat remaining within the 1.3 mile home range. These sites were assumed highly unlikely to persist or contribute to the demographics of the northern spotted owl population.

Occupied sites, where owls are thought to have *not* been displaced by fire, would potentially be at a higher risk of impacts from post fire activities; versus sites where owls were likely displaced due to habitat loss from the highest severity fire and are no longer present in the immediate area.

Changes from the Alternative 2:

- No salvage harvest in units (see list of units in project design features) within "moderate potential" northern spotted owl core areas except for specifically designated core areas, as described above.
- No salvage harvest in units less than 20 acres in size (see list of units in project design features).
- No salvage harvest in the Beaver Fire area.

Alternative 3 is also designed to retain legacy components for future habitat development, reduce effects to northern spotted owl habitat, and lessen the effects to connectivity while still meeting the purpose and need for action. Table 2-12 describes in detail how each concern was addressed.

Table 2-12: Concerns addressed by the development of alternative 3

Concern About:	Addressed by:
The effects of salvage logging on the long term development of the affected stand for future late successional habitat, as described by the Regional Ecosystem Office/LSR working group, interdisciplinary team internal review, and as raised by the public.	Retaining important habitat elements such as large trees, snags, and coarse woody debris while avoiding treatment in mixed-severity fire-affected forested areas. Many northern spotted owl activity centers were affected by the fire and this alternative is designed to reduce the effects of treatments on sites likely to persist in the future while balancing the need to reduce the potential of future high severity fire affecting additional habitat. Large trees and snags provide valuable wildlife habitat for many species and this alternative will retain more of these legacy features to provide structure for the development of late successional habitat. This alternative will benefit the ESA-listed northern spotted owl, ESA proposed listed fisher, survey and manage species, management indicator species and Forest Service Sensitive species by minimizing the impacts from fuels treatments.
Habitat Connectivity	Habitat connectivity was affected by fire and this alternative modifies proposed treatments in order to address connectivity in areas that may provide wildlife with the opportunity to move from one patch of habitat to another.
Post fire natural stand development[20] and habitat requirements of post fire or snag associated species	Integrating recent science on post-fire natural stand development. This will be addressed with the MIS and Forest Service sensitive species analysis, as well as the snag and legacy tree pdfs. In addition, areas outside of units and mixed severity patches within the project area will provide habitat for a variety of wildlife species. Retaining snags and legacy features on the landscape will provide future structure for wildlife species. Salvage units and burned plantations will be replanted. As these stands develop, retained snag and legacy features will provide structure found in a more mature forest. In the short term species will also benefit from the pulse of dead and dying trees, grasses and forbs found within the project area.

[20] e.g. *Fire Science Brief* 2009, Wagenbrenner 2015, Hanson et al 2013, PSW GTR-247, Bond et al 2013, Hutto 2006

Concern About:	Addressed by:
The short term impacts to northern spotted owl that may occupy fire affected forested areas, as well as long term use of small pockets of mixed burn severity within active northern spotted owl activity centers.	Nesting, roosting and foraging habitat and mixed burn severity inclusions (RAVG grid code 1 or 2) within treatment units will not be salvage harvested. Removing fuels within treatment units has the potential to create short term impacts to spotted owl foraging and prey habitat. This will be balanced with fuels treatments and replanting the salvaged treatment units. The long-term goals are to reduce fire risk, protect remaining northern spotted owl nesting, roosting and foraging habitat, and replant treatment units. Replanting treatment units will move the project area toward late seral conditions more quickly than without treatment.
Large woody debris retention	Conserve an irreplaceable resource (Forest Plan 4-4). Retention of large woody debris would slowly improve soil organic matter, and would be especially beneficial where it has been lost to high soil burn severity. Retention of large woody debris is valuable to many wildlife species. Down wood provides sites for denning, resting and escape cover. This will improve tree growth over the long term that would aid in habitat development.

Treatments proposed in alternative 3 are the same as alternative 2 with the following exceptions:

Salvage Harvest (about 5,800 treatment acres within 9,600 acres of units)

Alternative 3 proposes salvage logging treatments on approximately 5,800 acres within about 9,600 acres of salvage units on Forest lands. Alternative 3 proposes no salvage treatment within core areas classified as having either “high potential” or “moderate potential,” with the exception of four “moderate potential” core areas (KL1265, KL4133, KLNew3A,and KL1202). These four sites experienced significant amounts of high severity fire that removed virtually all suitable habitat within the 0.5 mile core area, but had sufficient habitat remaining in the home range. The Level One consultation team assumed this adjacent habitat would allow for the northern spotted owls to potentially shift their core area to utilize existing suitable habitat adjacent to the severely burned, previously occupied core areas.

Fisher Habitat

No salvage treatments are proposed in units located in the Beaver project area in order to retain connectivity in the Beaver Fire area. Wildlife-11, 12, and 13 project design features were developed for alternative 3 responding to the need for protecting fisher habitat characteristics including large decadent trees with cavities, select for retention Douglas-fir and ponderosa pine snags over true fir snags where possible, and retaining snags within or adjacent to unique landscape features such as rock outcroppings, seeps, and springs.

Table 2-13: Acres of salvage harvest proposed in alternative 3 by logging system

Logging System	Beaver Fire	Happy Camp Complex	Whites Fire	Grand Total
	Acres of Treatment (Unit)[b]			
Ground-based	0 (0)	350 (570)	20 (40)	370 (610)
Skyline	0 (0)	2,890 (4,410)	120(230)	3,010 (4,640)
Helicopter	0 (0)	2,130 (3,910)	260 (430)	2,390 (4,340)

Logging System	Beaver Fire	Happy Camp Complex	Whites Fire	Grand Total
Total Treatment / (Unit) Acres	0 (0)	5,370 (8,890)	400 (700)	5,800 (9,600)

[a] Treatments are estimated acres within units where more than 50% mortality occurred and where salvage activity is proposed. Treatment areas avoid riparian reserves and areas where less than 50% mortality occurred.
[b] Units are larger than treatment areas because they include salvage harvest acres, as well as areas where no harvest will occur such as riparian reserves and areas with less than 50% mortality that are within unit boundaries.
[c] Acres are estimates based on GIS and field data. Values are rounded to the nearest ten acres for individual treatment methods (skyline etc.) and to the nearest 100 acres for estimates of total treatment acres by alternative.

Table 2-14: Acres of salvage harvest units proposed in alternative 3 by land allocation

Salvage Harvest by Management Area	Beaver Fire	Happy Camp Complex	Whites Fire	Total Acres [a]
General Forest		540	0	540
Partial Retention VQO		980	10	990
Recreational River		110	30	140
Retention VQO		190	0	190
Riparian Area		500	40	540
Special Habitat, LSR		5,870	620	6,490
Special Habitat, T&E Species		700	0	710
Grand Total (acres)	**0**	**8,890**	**700**	**9,600**

[a] Acres are estimates based on GIS and field data. Values are rounded to the nearest ten acres for individual treatment methods (skyline etc.) and to the nearest 100 acres for estimates of total treatment acres by alternative.

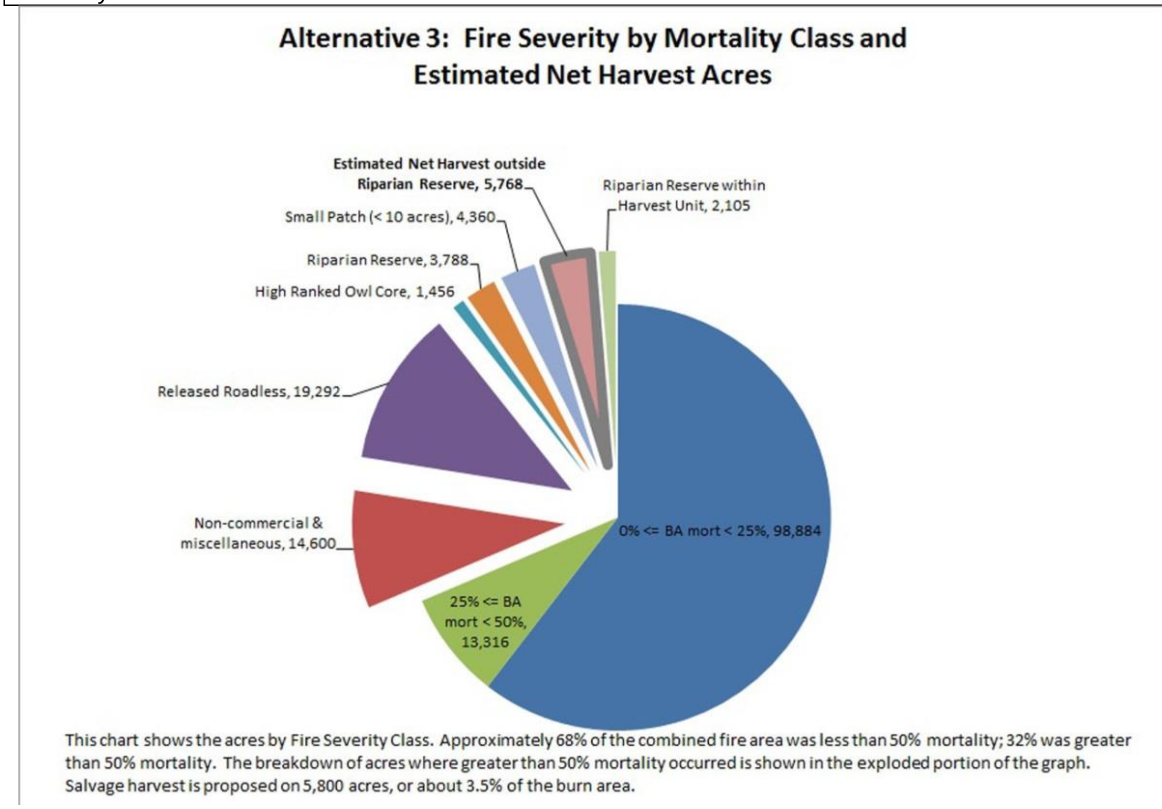


Figure 2-3: Fire Severity by Mortality Class and Estimated Net Harvest Acres for Alternative 3

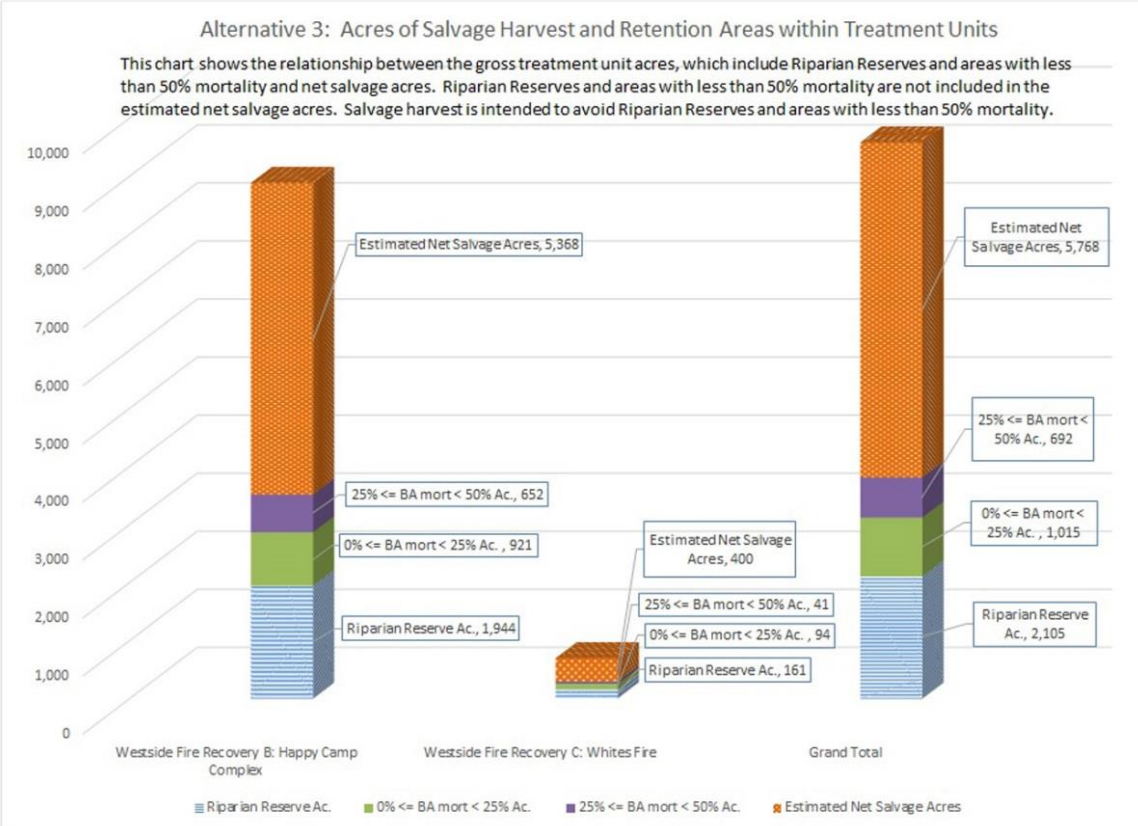


Figure 2-4:Acres of Salvage Harvest and Retention Areas within Treatment Units in Alternative 3

Roadside Hazard Treatment (650 miles)

Roadside hazard treatments are described in alternative 2. Acres associated with these treatments are listed in Table 2-3and Table 2-4 and in appendix F.

Hazardous Fuel Treatment (about 22,900 acres)

Hazardous fuels treatments and proposed units are described in alternative 2. Acres associated with these treatments are listed in Table 2-5 and Table 2-6 and in appendix F.

Site Preparation, Planting, and Release (about 12,900 acres)

Site preparation, planting, and release as described in alternative 2 will be implemented in about 7,400 acres of plantations and natural units (non-salvage harvest units), and in 9,500 acres of salvage harvest units. Acres were adjusted based on the amount of salvage harvest units removed from treatment for this alternative. Based on the removal of units within core areas classified as having either ‘high potential’ or ‘moderate potential’ and the removal of salvage treatment in units located in the Beaver project, salvage harvest acres decreased.

Table 2-15: Acres of site preparation, planting, and release in alternative 3 by unit treatment type.

Unit Treatment Type	Beaver Fire	Happy Camp Complex	Whites Fire	Grand Total
Total Site Preparation	**4,547**	**30,315**	**3012**	**11,656**
Plantations	1,112	3,170	599	4,881
Natural Units (Non-salvage Harvested)	621	325	29	975

Unit Treatment Type	Beaver Fire	Happy Camp Complex	Whites Fire	Grand Total
Salvage Harvest Units	0	5,370	400	5,800
Total Reforestation/Release	**1407**	**10,725**	**992**	**13,154**
Plantations	843	4,988	563	6,394
Natural Units (Non-salvage Harvested)	564	367	29	960
Salvage Harvest Units	0	5,370	400	5,800

Table 2-16: Acres of only site preparation, planting, and release for alternative 3 by management area (does not include acres of site preparation, planting, and release in salvage harvest units)

Site Preparation and Planting/Release by Management Area	Beaver Fire	Happy Camp Complex	Whites Fire	Grand Total
General Forest (MA17)	502	637	0	1139
Partial Retention VQO (MA15)	870	1,149	0	2,019
Recreational River (MA13)	0	12	0	12
Retention VQO (MA11)	0	27	0	27
Riparian Area (MA10)	385	398	0	783
Scenic River (MA12)	0	0	0	0
Special Habitat, LSR (MA5)	16	3,222	638	3,876
Special Habitat, Eagle/Falcon (MA5)	0	26	0	26
Grand Total	**1773**	**5,471**	**638**	**7,882**

Connected Actions

Road Access

Project access for this alternative is the same as alternative 2. Implementation of this alternative will require the use of National Forest Transportation System roads and County Roads as displayed in alternative 2, Table 2-10. System roads will be maintained as needed for alternative 3 implementation. All temporary roads will be closed and hydrologically stabilized according the project design features.

Landings and Legacy Sites

Both landings and legacy site actions are described in alternative 2. Alternative 3 is the same as alternative 2 with the exception that fewer landing will be needed to implement this alternative.

Alternative 4

Alternative 4 was developed to reduced impact to watershed, including federally-listed Coho Salmon and was developed through consultation discussions between the Forest Service and National Marine Fisheries Service and in response to relevant public issue numbers two and three (comment letter numbers 1147 and 1148) raised about the effects of the proposed action on watershed conditions and recovery. Soils and riparian areas were impacted to varying degrees across the project area due to the 2014 wildfires and in some areas the effects were severe and likely to result in downstream impacts to water quality and fisheries habitat. Riparian and aquatic resources in general across the project area are negatively affected by the current post-fire condition due to changes in natural processes such as hillslope erosion and stream sedimentation, and changed conditions such as effective stream shade and flow regime. Considering the impacted current condition, the concern is that further ground disturbance especially in the most impacted and/or sensitive watershed areas may result in additive negative effects to aquatic resources including habitat for Endangered Species Act-listed Coho Salmon.

Alternative 4 is designed to reduce watershed disturbance and impacts to water quality and fisheries, relative to the proposed action, while still meeting the purpose and need for action. This alternative takes a more conservative approach to implementing the Forest Plan's Aquatic Conservation Strategy by reducing or eliminating temporary road actions, especially within key watershed. The interdisciplinary team has identified the most sensitive areas (7th field watersheds) to further ground disturbance, based on existing watershed condition and distribution of listed fish. The criteria used to identify the most sensitive 7th field watersheds included the following:

1. *Existing watershed disturbance*—measured by analysis of fire impacts (vegetation and soil burn severity) and Cumulative Watershed Effects model values for existing condition (which include BAER work);
2. *Unstable slopes and landslide potential*—quantitatively reflected in Cumulative Watershed Effects values, and further evaluated based on field review and information on past site-specific disturbance and recovery;
3. *Stream monitoring data*—Forest level water quality monitoring (sediment and temperature) of reference and managed streams mostly pre 2014 fires;
4. *Endangered Species Act-listed Coho Salmon*—proximity/probability and magnitude/duration of likely impacts to Coho Salmon and their habitat;
5. *Key Watersheds*—doing the most, within the scope of this project, to achieve Aquatic Conservation Strategy objectives in Salmon River, and Elk and Grider creeks; and
6. *Professional judgment*—informed by field visits, literature review, and site-specific knowledge.

The following viewsheds were identified as the most sensitive 7th field watersheds (drainages):

- Three drainages along Beaver Creek including: Buckhorn Gul-Beaver, Dutch, and Lower West Fork Beaver;
- Walker Creek;
- Doggett Creek;
- Caroline Creek along the Klamath River;
- Kohl Creek;
- Music Creek;
- O'Neil Creek;
- Three drainages along Elk Creek including: Lower East Fork Elk, Upper East Fork Elk, and Upper Elk;
- China Creek;
- Four drainages along Grider Creek including: Cliff Valley, Lower Grider, Upper Grider, and Rancheria Creek;
- Tompkins Creek; and
- Whites Gulch

Alternative 4 proposes to treat these watersheds differently to account for the specific conditions, water quality and fish habitat impairments, and recovery potential of each. Alternative 4 would reduce the ground disturbance-related impacts in these areas by eliminating temporary road actions (except for less than 250 feet stretches of temporary road on ridgetops). This alternative also includes restorative actions within riparian reserves where they occur within salvage harvest units, eliminates hazard tree removal on Maintenance Level 1 roads that are not used by the project, and allows for no landing construction within riparian reserves (several exceptions apply with alternative 2 and exceptions do not apply with alternative 4).

Changes from the Alternative 2

Within the identified 7th field watersheds, along with all project design features described for the proposed action, the following additional restrictions/mitigations are proposed:

- No use of non-system existing road beds for temporary access (includes previously decommissioned roads) with the following exception:
  1. Use of non-system temporary roads will be limited to segments along ridgetops and not hydrologically connected to the drainage network (no crossings or adjacent to streams).
  2. In Key Watersheds, any use of all temporary roads will be less than 250 feet in length, on ridgetops and not hydrologically connected to the drainage network (no crossings or adjacent to streams);
- No use of maintenance level 1 roads if stream crossings reconstruction is needed;
- Maintenance Level 1 roads that are not needed to implement actions in this project will not be included in hazard tree removal;

Treatments proposed in alternative 4 are the same as alternative 2 with the following exceptions:

Salvage Harvest (about 5,900 treatment acres within 10,200 acres of units)

Alternative 4 proposes salvage logging treatments on approximately 5,900 acres within about 10,200 acres of salvage units on Forest lands. Acres for harvest were adjusted based on accessibility following the removal of temporary use along non-system existing road beds, including previously decommissioned roads and maintenance level one roads where stream crossing reconstruction is needed. Acres were adjusted to account for these changes.

This alternative also proposes only manual treatment for all salvage harvest treatments within riparian reserves. Manual or hand treatment will fall standing dead conifers up to 16 inches in diameter at breast height with a chainsaw or other cutting implement, then cut and scattered throughout the riparian area to achieve 70 percent soil cover in riparian reserves within salvage harvest units. On slopes greater than 35 percent, manual felling of standing dead conifers, hardwoods, and brush will be limited to material less than ten inches diameter at breast height because of concerns about safety and effectiveness of treating large, heavy material by hand on steep grounds. The goal is to promote more rapid soil recovery and natural regeneration without additional planting in these units. If fuel loading exceeds ten tons per acre (and/or greater than 70 percent soil cover), excess fuels can be piled and burned or broadcast burned.

Table 2-17: Acres of salvage harvest in alternative 4 by logging system

Logging System	Beaver Fire Treatment[a] (Unit) b/ Acres	Happy Camp Complex Treatment[a] (Unit)[b] Acres	Whites Fire Treatment[a] (Unit)[b] Acres	Grand Total[c] Treatment[a] (Unit)[b] Acres
Ground-based	380 / (600)	380 / (650)	20 / (40)	780 / (1,290)
Skyline	60 / (160)	2,560 / (4,130)	140 /(270)	2,760 / (4,560)
Helicopter	0 / (0)	2,070 / (3,830)	280 / (540)	2,350 (4,370)
Total Treatment / (Unit) Acres	**440 / (760)**	**5,010 / (8,610)**	**440 / (850)**	**5,900 / (10,200)**

[a] Treatments are estimated acres within units where more than 50% mortality occurred and where salvage activity is proposed. Treatment areas avoid riparian reserves and areas where less than 50% mortality occurred.

[b] Units are larger than treatment areas because they include salvage harvest acres, as well as areas where no harvest will occur such as riparian reserves and areas with less than 50% mortality that are within unit boundaries.

[c] Acres are estimates based on GIS and field data. Values are rounded to the nearest 10 acres for individual treatment methods (skyline etc.) and to the nearest 100 acres for estimates of total treatment acres by alternative.

Table 2-18: Acres of salvage harvest units in alternative 4 by land allocation

Salvage Harvest by Management Area	Beaver Fire	Happy Camp Complex	Whites Fire	Total Acres [a]
General Forest	420	600	0	1020
Partial Retention VQO	130	980	10	1,120
Recreational River	0	120	30	150
Retention VQO	0	180	0	180
Riparian Area	150	530	30	710
Special Habitat, LSR	60	5,660	780	6,500
Special Habitat, T&E Species	0	540	0	540
Grand Total (acres)	**760**	**8,610**	**850**	**10,220**

[a] Acres are estimates based on GIS and field data. Values are rounded to the nearest ten acres for individual treatment methods (skyline etc.) and to the nearest 100 acres for estimates of total treatment acres by alternative.

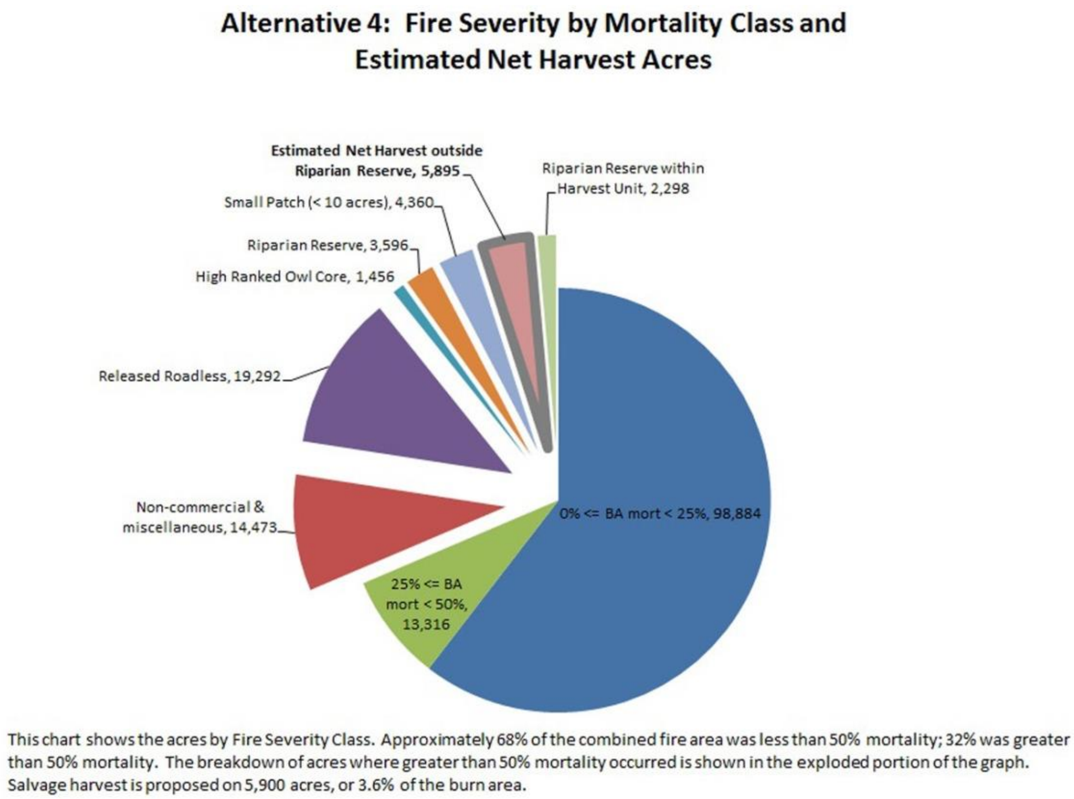


Figure 2-5: Fire Severity by Mortality Class and Estimated Net Harvest Acres in Alternative 4

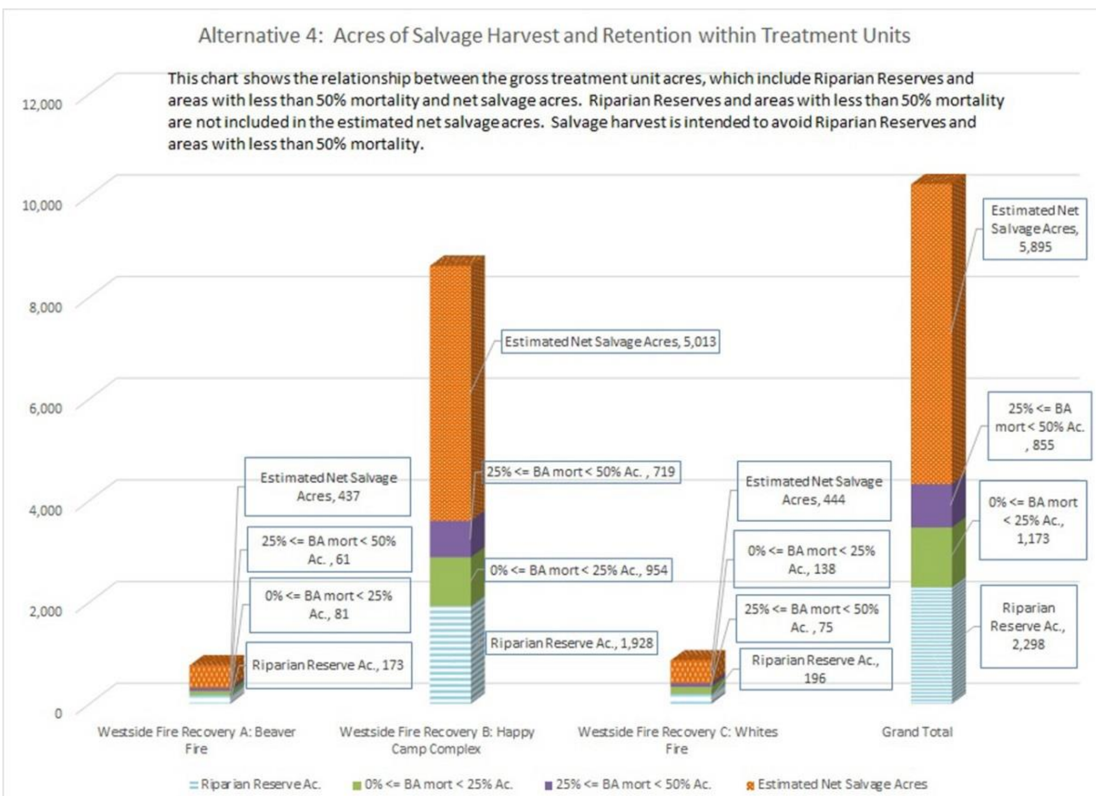


Figure 2-6: Acres of Salvage Harvest and Retention within Treatment Units for alternative 4

Roadside Hazard Treatments (621 miles)

Alternative 4 proposes treatment along 621 miles of road or about 19,600 acres of roadside hazard. Roadside hazard treatment and criteria used to identify hazard or danger trees are described in alternative 2. Miles of roads and acres for roadside hazard were adjusted based on the removal of treatment along maintenance level one roads not used to implement this alternative. Maintenance level one roads were removed from this alternative because they were not needed to implement actions for alternative 4.

Table 2-19: Miles of roadside hazard treatments by maintenance level

Type of Road Access (Maintenance Level)	Beaver Fire	Happy Camp Complex	Whites Fire	Grand Total
Level 1 (basic custodial care, closed to public)	15	30	1	46
Level 2 (high clearance vehicles)	71	186	29	287
Level 3 (suitable for passenger cars)	23	68	17	108
Level 4 (moderate degree of user comfort)	0	7	0	7
Level 5 (high degree of user comfort)	2	0	0	2
County Roads/State Highways	49	95	27	171
Grand Total	**160**	**387**	**75**	**621**

Table 2-20: Acres of roadside hazard treatment by management area

Roadside Hazard Treatment by Management Area	Beaver Fire	Happy Camp Complex	Whites Fire	Grand Total
General Forest	1,073	1,081	0	2,154
Partial Retention VQO	673	2,531	2	3,206
Recreational River	0	220	48	268
Retention VQO	26	203	0	229
Riparian Area	935	2,005	247	3,187
Scenic River	0	55	0	55
Special Habitat, LSR	127	7,887	2,338	10,352
Special Habitat, T&E Species	0	121	0	121
Grand Total	**2,834**	**14,103**	**2,635**	**19,572**

Hazardous Fuel Treatments (about 22,900 acres)

Hazardous fuels treatments and proposed units are described in alternative 2. Acres associated with these treatments are listed in Table 2-5 and Table 2-6 and in appendix F.

Site Preparation, Planting, and Release (about 17,500 acres)

Site preparation, planting, and release as described in alternative 2 will be implemented in 7,400 acres of plantations and natural units (non-salvage harvest units), and in 5,900 acres of salvage harvest units. No planting is proposed in salvage harvest units that overlap riparian reserves. Acres were adjusted based on the amount of salvage harvest units removed from treatment based on changes road use and access.

Table 2-21: Acres of site preparation, planting, and release in alternative 4 by treatment type

Treatment Type	Beaver Fire	Happy Camp Complex	Whites Fire	Grand Total
Total Site Preparation	**5,867**	**29,295**	**3132**	**38,324**
Plantations	1,112	3,170	599	4,881
Within Natural Units (Non-salvage Harvested)	621	325	29	975
Within Salvage Harvest Units	440	5010	440	5900
Total Reforestation/Release	**1847**	**10,395**	**1032**	**13,284**
Within Plantations	843	4,988	563	6,394
Natural Units	564	397	29	990
Salvage Harvest Units	440	5010	440	5900

Table 2-22: Acres of site preparation, planting and release in alternative 4 by land allocation

Site Preparation and Planting/ Release by Management Area	Beaver Fire	Happy Camp Complex	Whites Fire	Grand Total
General Forest (MA17)	502	637	0	1139
Partial Retention VQO (MA15)	870	1,149	0	2,019
Recreational River (MA13)	0	12	0	12
Retention VQO (MA11)	0	27	0	27
Riparian Area (MA10)	385	398	0	783
Scenic River (MA12)	0	0	0	0
Special Habitat, LSR (MA5)	16	3,222	638	3,876
Special Habitat, Eagle/Falcon (MA5)	0	26	0	26
Grand Total	**1773**	**5,471**	**638**	**7,882**

Connected Actions

Road Access

Project access will require the use of National Forest Transportation System roads and County Roads. System roads will be maintained as needed for alternative 4 implementation as displayed in Table 2-23. There will be no roads added to the National Forest Transportation System as a result of this project; about two miles of new temporary roads will be constructed. This alternative limits the amount of non-system existing road beds for temporary access including previously decommissioned roads with the following exceptions: (1) new temporary roads in key watersheds will be less than 250 feet in length; and, (2) all new temporary and non-system temporary roads will be limited to segments on ridgetops and not hydrologically connected to the drainage network (no crossings or adjacent to streams). These two exceptions account for about five miles of temporary roads on existing roadbeds used for project access. One mile, of these five miles of temporary roads on existing roadbeds is proposed reopening of previously decommissioned roads. All temporary roads will be closed and hydrologically stabilized according the project design features.

Table 2-23: Miles of road access for alternative 4

Type of Road Access	Beaver Fire	Happy Camp Complex	Whites Fire	Grand Total
Forest System, County, and State	**146**	**353**	**63**	**562**
New Temporary	**0**	**1**	**1**	**2**
Existing Temporary				
Temporary Road on Existing	1	2	1	4
Re-open Decommissioned	0	1	0	1
Total Existing Temporary	**1**	**3**	**1**	**5**
Grand Total	**147**	**357**	**65**	**569**

Landings and Legacy Sites

Both landings and legacy site actions are described in alternative 2. Alternative 4 is the same as alternative 2 with the exception that fewer landing will be needed to implement this alternative.

Alternative 5

Alternative 5 is responsive to relevant issue three in order to address disagreements about the effects of salvage logging and site preparation on late successional reserves, riparian reserves, and inventoried roadless areas by removing all units that overlap these management areas. Alternative 5 is also responsive to relevant issue four in order to address disagreements about whether or not the proposed action sufficiently addresses the needs for fuels reduction adjacent to private timber lands in the Beaver Fire area by proposing an additional 1,200 acres of hazardous fuels treatments with adjoining private land treatments to increase fuel breaks along ridge and road systems within the Beaver Fire area.

Treatments in Alternative 5 are identical to the proposed action with the following exceptions:

Salvage Harvest (about 1,900 treatment acres within 3,400 acres of units)

Alternative 5 proposes salvage logging treatments on approximately 1,900 acres within about 3,400 acres of salvage units on Forest lands. Salvage harvest (as described in alternative 2) is only proposed within management areas (MA) considered as matrix lands that exist within the project area, including retention (MA 11), scenic rivers (MA 12), recreation rivers (MA 13), partial retention (MA 15), and general forest (MA 17) management areas (matrix lands are defined on the1994 Forest Plan EIS, Preferred Alternative Land Allocations Map). Compared to alternative 2, alternative 5 removes salvage harvest from within special habitat (MA 5), special interest areas (MA 7), and riparian reserves (MA-10).

Table 2-24: Acres of treatment proposed in alternative 5 by logging systems.

Logging System	Beaver Fire Treatment[a] (Unit) b/ Acres	Happy Camp Complex Treatment[a] (Unit)[b] Acres	Whites Fire Treatment[a] (Unit)[b] Acres	Grand Total[c] Treatment[a] (Unit)[b] Acres
Ground-based	420 / (660)	140 / (230)	1 / (15)	560 / (910)

Logging System	Beaver Fire Treatment[a] (Unit) b/ Acres	Happy Camp Complex Treatment[a] (Unit)[b] Acres	Whites Fire Treatment[a] (Unit)[b] Acres	Grand Total[c] Treatment[a] (Unit)[b] Acres
Skyline	70 / (170)	470 / (820)	0 /(0)	540 / (990)
Helicopter	0 / (0)	770 / (1,460)	30 / (60)	800 (1,520)
Total Treatment / (Unit) Acres	**490 / (830)**	**1,380 / (2,510)**	**30 / (80)**	**1,900 / (3,400)**

[a] Treatments are estimated acres within units where more than 50% mortality occurred and where salvage activity is proposed. Treatment areas avoid riparian reserves and areas where less than 50% mortality occurred**.**

[b] Units are larger than treatment areas because they include salvage harvest acres, as well as areas where no harvest will occur such as riparian reserves and areas with less than 50% mortality that are within unit boundaries.

[c] Acres are estimates based on GIS and field data. Values are rounded to the nearest 10 acres for individual treatment methods (skyline etc.) and to the nearest 100 acres for estimates of total treatment acres by alternative.

Table 2-25: Acres of proposed salvage harvest units in alternative 5 by management area

Salvage Harvest by Management Area	Beaver Fire	Happy Camp Complex	Whites Fire	Total Acres [a]
General Forest	460	590	0	1050
Partial Retention VQO	130	1,070	10	1,210
Recreational River	0	120	30	150
Retention VQO	0	170	0	170
Riparian Area	180	530	40	750
Special Habitat, LSR	60	2	0	62
Special Habitat, T&E Species	0	30	0	30
Grand Total (acres)	**830**	**2,5120**	**80**	**3,422**

[a] Acres are estimates based on GIS and field data. Values are rounded to the nearest ten acres for individual treatment methods (skyline etc.) and to the nearest 100 acres for estimates of total treatment acres by alternative.

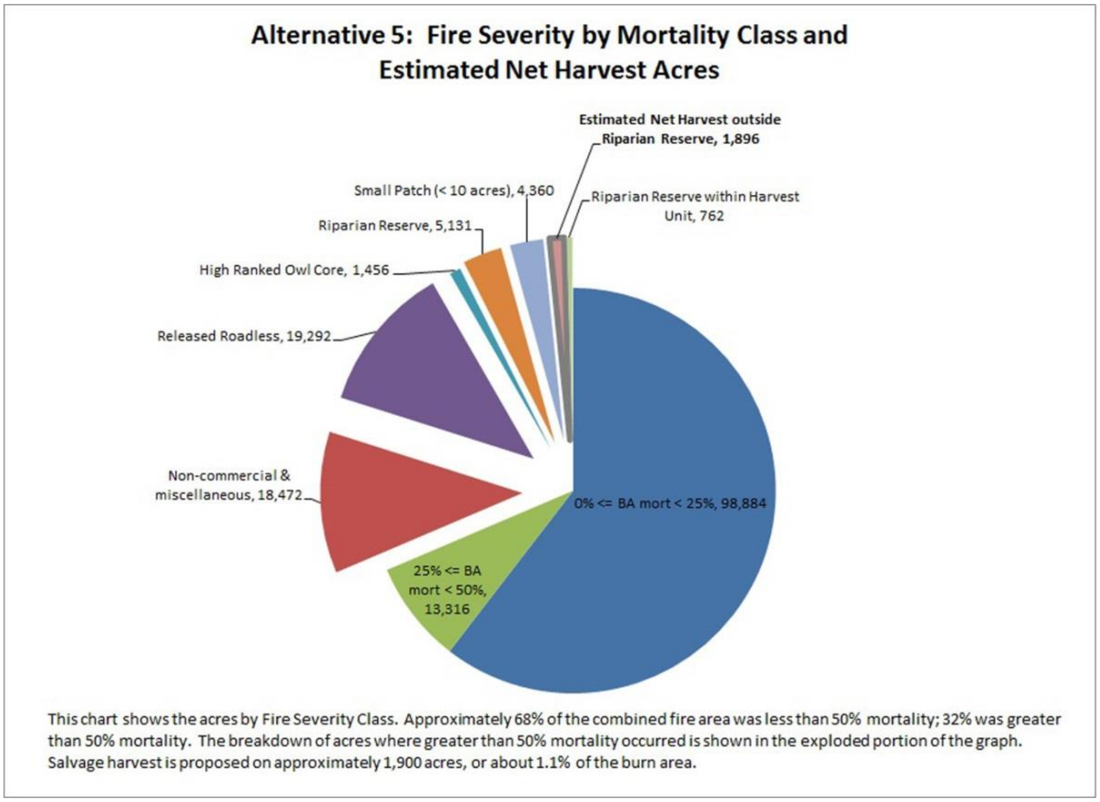


Figure 2-7: Fire Severity by Mortality Class and Estimated Net Harvest Acres in Alternative 5

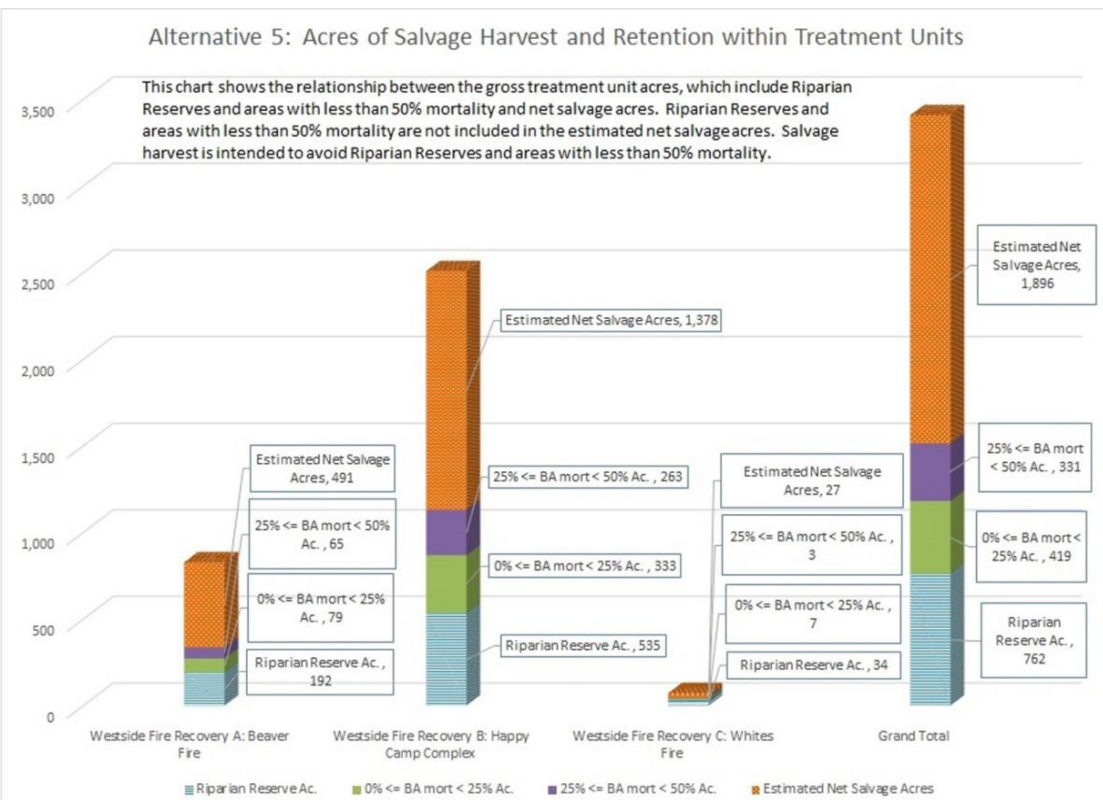


Figure 2-8: Acres of Salvage Harvest and Retention within Treatment Units in Alternative 5

Roadside Hazard Treatments (about 643 miles)

Roadside hazard treatments are described in alternative 2. Acres associated with these treatments are listed in Table 2-3 and Table 2-4 and in appendix G.

Hazardous Fuels Treatments (about 23,000 acres)

Hazardous fuels treatments is proposed on an additional 1,200 acres adjoining private land treatments to increase fuel breaks along ridge and road systems within the Beaver Fire area. Units were identified based on proximity to private timberlands and the concept of connecting fuel treatments utilizing an "all-lands" approach. These additional hazardous fuels treatments in coordination with salvage harvest will reduce high densities of snags and surface fuels adjacent to private timberlands.

Table 2-26: Alternative 5 treatment acres by treatment type

Fuels Treatments				
Treatment Type	**Beaver Fire**	**Happy Camp Complex**	**Whites Fire**	**Grand Total**
Wildland Urban Interface	613	1,197	413	2,223
Fuels Management Zones	866	3,024	917	4,807
Roadside Fuels Treatments	612	3,012	807	4,431
Prescribed Burn	0	1,556	9,870	11,426
Grand Total	**2091**	**8,789**	**12,007**	**22,887**

Table 2-27: Alternative 5 fuels treatment by land allocations

Fuels Treatments by Management Area	Beaver Fire	Happy Camp Complex	Whites Fire	Grand Total
General Forest (MA17)	892	319	259	1470
Partial Retention VQO (MA15)	1,368	2,156	1,868	5,392
Recreational River (MA13)	0	343	518	861
Retention VQO (MA11)	293	670	1	964
Riparian Area (MA10)	630	1,748	1,520	3,898
Scenic River (MA12)	0	43	0	43
Special Habitat, LSR (MA5)	39	3,300	6,835	10,174
Special Habitat, Eagle/Falcon (MA5)	0	164	0	164
Grand Total	**3,222**	**8,743**	**11,001**	**22,966**

Site Preparation, Planting, and Release (about 7,300 acres)

Site preparation, planting, and release are proposed only within management areas considered as matrix lands, as identified in the description of salvage harvest in this alternative. Compared to alternative 2, alternative 5 removes site preparation, planting, and release in salvage harvest units that were within special habitat (MA 5), special interest areas (MA 7), riparian reserves (MA 10), and inventoried roadless areas (not defined as a management area in the Forest Plan).

Table 2-28: Acres of proposed site preparation, planting, and release for alternative 5 by treatment type

Treatment Type	Beaver Fire	Happy Camp Complex	Whites Fire	Grand Total
Site Preparation	**6,006**	**8,964**	**90**	**15,060**
Plantations	1,101	684	0	1,785
Natural Units (Non-salvage Harvested)	621	114	0	735
Salvage Harvest Units	490	1,380	30	1,900
Reforestation/Release	**1897**	**3,393**	**30**	**5,320**
Plantations	843	1,979	0	2,822
Natural Units	564	34	0	598
Salvage Harvest Units	490	1,380	30	1,900

Table 2-29: Acres of only site preparation, planting, and release for alternative 5 by management area (does not include acres of site preparation, planting, and release in salvage harvest units)

Site Preparation and Planting/Release by Management Area	Beaver Fire	Happy Camp Complex	Whites Fire	Grand Total
General Forest (MA17)	502	601	0	1103
Partial Retention VQO (MA15)	870	1,055	0	1,925
Recreational River (MA13)	0	12	0	12
Retention VQO (MA11)	0	27	0	27
Riparian Area (MA10)	385	371	0	756
Scenic River (MA12)	0	0	0	0
Special Habitat, LSR (MA5)	5	2	0	7
Special Habitat, Eagle/Falcon (MA5)	0	26	0	26
Grand Total (acres)	**1762**	**2,094**	**0**	**3,856**

Connected Actions

Road Access

Project access will require the use of National Forest Transportation System roads and county roads. There will be no roads added to the National Forest Transportation System as a result of this project; about one mile of new temporary road will be constructed, and about seven miles of temporary roads on existing roadbeds will be used for project access. Three miles of those seven miles of temporary roads on existing roadbeds are proposed reopening of previously decommissioned roads. All temporary roads will be closed and hydrologically stabilized according the project design features.

Table 2-30: Miles of road access for alternative 5

Type of Road Access in Miles	Beaver Fire	Happy Camp Complex	Whites Fire	Grand Total
Forest System, County, and State	**146**	**353**	**63**	**562**
New Temporary	**0**	**1**	**0**	**1**
Existing Temporary				
Temporary Road on Existing	3	1	0	4
Re-open Decommissioned	0	3	0	3
Total Existing Temporary	**3**	**4**	**0**	**7**
Grand Total	**149**	**358**	**63**	**570**

Landings and Legacy Sites

Both landings and legacy site actions are described in alternative 2. Alternative 5 is the same as alternative 2 with the exception that fewer landing will be needed to implement this alternative.

Comparison of Alternatives

Table 2-31provides a brief summary of activities and treatment acres proposed for each alternative analyzed in detail. See treatment maps in appendix A and treatment by prescription and unit tables in appendix F and G for more detail. Table 2-32 compares alternatives in response to the purpose and need of the project. Table 2-33 compares them in response to relevant issues, and Table 2-34 displays a comparison of the environmental effects of alternatives by resource.

Table 2-31: Comparison of miles of roads and acres of treatment

Treatments	Alternative 1 (acres/miles)	Alternative 2 (acres/miles)	Alternative 3 (acres/miles)	Alternative 4 (acres/miles)	Alternative 5 (acres/miles)
Salvage Harvest (acres)	**0**	**6,800**	**5,800**	**5,900**	**1,900**
Ground-based	0	850	370	780	560
Skyline	0	3,320	3,010	2,760	540
Helicopter	0	2,640	2,390	2,350	800
Roadside Hazard Treatments (miles/acres)	**0**	**650 miles / 20,500 acres**	**650 miles / 20,500 acres**	**650 miles / 19,580 acres**	**643 miles/ 20,500 acres**
Hazardous Fuel Treatments (acres)	**0**	**22,900**	**22,900**	**22,900**	**24,099**
Wildland Urban Interface	0	2,223	2,223	2,233	2,233
Fuels Management Zones	0	4,807	4,807	4,807	6,019
Roadside Fuels Treatments	0	4,431	4,431	4,431	4,431
Prescribed Burn	0	11,426	11,426	11,426	11,426
Site Preparation, Reforestation, and Release Treatments (acres)	**0**	**36,641**	**32,441**	**33,641**	**12,820**
Site Preparation	0	41,026	38,026	38,326	15,220
Plantations	0	4,881	4,881	4,881	1,785
Natural Units (Non-salvage harvest)	0	975	975	975	735
Salvage Harvest Units	0	6,800	5,800	5,900	1,900
Reforestation and Release	0	14,185	13,185	13,285	5,400
Plantations	0	6,394	6,394	6,394	2,822
Natural Units (Non-salvage harvest)	0	991	991	991	678
Salvage Harvest	0	6,800	5,800	5,900	1,900
Road Access (miles)	**0**				

Treatments	Alternative 1 (acres/miles)	Alternative 2 (acres/miles)	Alternative 3 (acres/miles)	Alternative 4 (acres/miles)	Alternative 5 (acres/miles)
Forest System Roads, County Roads and State Highway.	0	562	562	562	562
New Temporary Roads	0	4	4	1	<1
Temporary Roads on Existing Roadbeds	0	10	8	3	4
Reopen Decommissioned Roads	0	9	9	<1	2
Legacy Sites (count)	**0**	**150**	**150**	**150**	**150**

Table 2-32: Comparison of alternative effects related to the purpose and need of the project

Meeting Purpose and Need	Measurement Indicator	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5
Provide for worker and public safety and access	Miles and acres of roadside hazard treatment	0 0	650 20,500	650 20,500	620 19,580	650 20,500
	Acres of fuels reduction treatment within WUI	0	2,220	2,220	2,220	2,220
	Acres where snags are removed by salvage and site prep.	0	6,800 acres salvage 7,900 acres site prep	5,800 acres salvage 7,900 acres site prep	5,900 acres salvage 7,900 acres prep	1,900 acres salvage 3,400 acres site prep
Improve fire suppression conditions for firefighters and community protection	Acres of resistance to control improved (large fuels removed)	0	6,800	5,800	5,900	1,900
	Acres of fuel breaks, prescribed burning and other fuels treatments	0	22,900	22,900	22,900	24,100
Capture the economic value of snags and hazard trees for a viable project and benefit to local	Timber sale income (in millions of dollars)	$0	$11.9	$9.8	$9.6	$6.3
	Labor income (in millions of dollars)	$0	$53.1	$46.5	$47.4	$21.9
	Employment	0	1,236	1,067	1,074	549

Meeting Purpose and Need	Measurement Indicator	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5
communities	(jobs)					
Provide for restored and fire-resilient forested ecosystems	Acres treated to promote regeneration through salvage harvest	0 acres	6,800	5,800	5,900	1,900
	Years to reach a mature stand in areas of salvage harvest	100+ years	40-60 years	40-60 years	40-60 years	40-60 years in matrix land; 100+ in non-matrix
	Type of vegetation regenerated in salvage harvest areas Short-term/ Long-term	Grass, forbs,brush/ Brush, hardwoods, isolated parches of conifers	Brush, hardwoods, young conifers/ Mature mixed conifer stands	Same as alternative 2	Same as alternative 2	Same as alternative 2 within matrix lands; isolated conifers elsewhere
	Total acres where fuels are reduced by salvage, and fuels treatments	0	6,800 acres salvage, 22,900 acres fuels treatments	5,800 acres salvage 22,900 acres fuels treatments	6,900 acres salvage, 22,900 acres fuels treatments	1,600 acres salvage 24,100 acres fuels treatments

Table 2-33: Comparison of alternative indicators by relevant issue

Issue	Measurement Indicator	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5
Relevant Issue 1: Effects of salvage logging on wildlife habitat	Acres of salvage logging on terrestrial indicators in Chpt. 3, Wildlife	0	See Table 2-34	See Table 2-34	See Table 2-34	See Table 2-34
Relevant Issue 2: Effects of salvage logging and required infrastructure on watershed health	Analysis indicators for watersheds in Chpt. 3, Hydrology	0	See Table 2-34	See Table 2-34	See Table 2-34	See Table 2-34
Relevant Issue 3: Effects of salvage logging and site preparation on late successional reserves (LSRs), riparian reserves (RRs) and inventoried roadless areas (IRAs)	Acres of salvage logging in LSRs	0	7,560	7,073	6,818	60
	Acres of site preparation in LSRs	0	3,876	3,876	638	7
	Acres of salvage logging in RRs	0	0	0	0	0
	Acres of site preparation in RRs	0	783	783	783	756
	Acres of salvage logging in IRAs	0	0	0	0	0

Issue	Measurement Indicator	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5
	Acres of site preparation in IRAs	0	0	0	0	0
Relevant Issue 4: Adequate fuels treatments adjacent to private timberlands in the Beaver Fire area	Acres of fuels treatments adjacent to private timberlands in the Beaver Fire area	0	870 acres	870 acres	870 acres	2,080 acres

Table 2-34: Comparison of effects of all alternatives by resource

	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Vegetation	Natural regeneration on 100% of project area. Regenerates as brush, hardwoods and isolated patches of conifers; meets the National Forest Management Act (NFMA) requirements by meeting Forest Plan standards.	Natural regeneration on about 85% of project area. Planted area regenerates as mature mixed conifer stands in the long term; meets NFMA by meeting Forest Plan standards.	Same as alternative 2 except that about 86% of the project area naturally regenerates.	Same as alternative 3.	Same as alternative 2 except that about 90% of the project area naturally regenerates.
Fuels	Fire hazards increase over time with 14,000 acres with a low hazard level and high fuel loading of large material (leading to resistance to control) after 10 years.	About 44,800 acres have a low hazard level after 10 years but no acres have a high fuel loading of large material (leading to resistance to control) after 10 years.	About 40,800 acres have a low hazard level after 10 years but no acres have a high fuel loading of large material (leading to resistance to control) after 10 years.	About 41,100 acres have a low hazard level after 10 years but no acres have a high fuel loading of large material (leading to resistance to control) after 10 years.	About 35,200 acres have a low hazard level after 10 years but no acres have a high fuel loading of large material (leading to resistance to control) after 10 years.
Wildlife: T&E	Risk to reproduction of northern spotted owl is very low or low for 17 activity centers, moderate for 51 and high for 12.	Risk to reproduction of northern spotted owl is very low or low for 17 activity centers, moderate for 51 and high for 12.	Same as alternative 2.	Same as alternative 2.	Same as alternative 2.
Wildlife: Critical Habitat	No acres of critical habitat are directly or indirectly affected; 552 acres are cumulatively affected by adding the effects of other projects on private land to the zero acres of effect of this alternative.	1,205 acres of critical habitat are directly or indirectly affected; 1,758 are cumulatively affected by adding the effects of other projects on private land to the acres affected by the alternative.	Same as alternative 2.	1,179 acres of critical habitat are directly or indirectly affected; 1,732 are cumulatively affected by adding the effects of other projects on private land to the acres affected by the alternative.	Same as alternative 2.
Wildlife: Forest Service Sensitive Species	No effect on roost sites for bats;	High risk of direct or indirect disturbance to 13 bat hibernaculum or maternities, moderate risk to 15 and low risk to 30 with cumulative effects changing these to 24 at high risk of	Same as alternative 2.	Same as alternative 2.	Same as alternative 2.

	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
		disturbance, 12 at moderate risk and 22 at low risk. Treatments may affect individuals but are not expected to result in a trend toward federal listing or loss of viability. Forest Plan standards are met.			
Wildlife: Management Indicator Species	No change in hardwood abundance from the current condition. No direct or indirect effects from this alternative on snag habitat but cumulative effects due to adding the effects of projects on private land will be about 1,692 acres will cumulatively be affected.	Hardwood habitat abundance is directly or indirectly changed on 728 acres; cumulatively habitat is affected on 1,322 acres. Snag habitat abundance is changed on from 1,123 acres to 11,001 acres, depending on the specific snag-associated species within the association. Cumulatively, this change is from 1,203 acres to 12,735 acres. Forest Plan standards are met.	The acreage of hardwood habitat affected is 717 acres directly or indirectly and 1,312 acres cumulatively. Snag habitat is affected on from 1,108 acres to 10,544 acres directly or indirectly and from 1,188 to 12,278 acres cumulatively. Forest Plan standards are met.	The acreage of hardwood habitat affected is 679 acres directly or indirectly and 1,273 acres cumulatively. Snag habitat is affected on from 1,096 acres to 10,264 acres directly or indirectly and from 1,176 to 11,999 acres cumulatively. Forest Plan standards are met.	The acreage of hardwood habitat affected is 713 acres directly or indirectly and 1,307 acres cumulatively. Snag habitat is affected on from 916 acres to 9,066 acres directly or indirectly and from 996 to 10,801 acres cumulatively. Forest Plan standards are met.
Wildlife: Survey and Manage Species	There are no direct, indirect or cumulative effects on known sites of survey and manage species.	76 known sites are protected from habitat disturbance by project design features. Treatments may affect individuals but there will be no significant negative impact to species or habitat.	Same as alternative 2.	Same as alternative 2.	Same as alternative 2.
Wildlife: Migratory Birds	Effects on migratory birds are disclosed for the threatened, endangered, Forest Service sensitive and management indicator species of birds.	Same as alternative 1.	Same as alternative 1.	Same as alternative 1.	Same as alternative 1.

	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Range	There would be no effect on the availability of forage and a neutral effect on rangeland condition.	The availability of forage would increase; there will be a neutral effect on rangeland condition.	Same as alternative 2.	Same as alternative 2.	The availability of forage would increase less than with other action alternatives; there will be a neutral effect on rangeland condition.
Botany (Threatened, Endangered, and Forest Service Sensitive Plants)	No effects on threatened, endangered, proposed or candidate plant species. No direct effects on Forest Service sensitive plant species. Indirect effects on these species from competition, lack of disturbance, delayed reforestation, sedimentation of aquatic habitat and increased risk of wildfire.	No effects on threatened, endangered, proposed or candidate plant species. Direct effects to individual Forest Service sensitive plant species may occur but are not likely to result in a trend toward federal listing or loss in population viability.	Same as alternative 2. In addition, the added retention of snag clumps and coarse woody debris would mitigate microclimate and provide substrates for sensitive species.	Same as alternative 2. Limiting treatments in Riparian Reserves would protect the majority of habitat for sensitive bryophytes and fungi; reduced road construction would limit risk of stream sedimentation.	Same as alternative 2.
Botany (Survey and Manage Species)	No direct effects; indirect long-term effects from competition, lack of disturbance, delayed reforestation and increased risk of wildfire.	No direct effects to category A, B and E species because all known sites will be protected. Minimal direct effects to category C and D species because high priority sites will be protected with the implementation of project design features.	Same as alternative 2. In addition, the added retention of snag clumps and coarse woody debris would mitigate microclimate and provide substrates for survey and manage species.	Same as alternative 2. Limiting treatments in Riparian Reserves would protect the majority of habitat for survey and manage bryophytes and fungi.	Same as alternative 2.
Botany (Non-native Invasive Species)	No direct effects; indirect long-term effects from habitat disturbance and non-project dependent vectors.	High risk of spread due to numerous existing NNIS populations, habitat vulnerability, non-project and project dependent vectors, and ground-disturbing activities. Project design features will mitigate but not eliminate high risk.	Same as alternative 2.	Same as alternative 2.	Risk of NNIS spread would be slightly less than for alternative 2 but the decrease in risk is not enough to lower the risk rating from high.
Fish and other Aquatic	No effects on stream temperature, sediment,	Non-measurable effects on temperature, large	Same as alternative 2.	Non-measurable effects on temperature, large	Non-measurable effects on temperature, large

	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Species	or large wood.	wood, and sediment at the watershed scale. Potentially sizeable effects on sediment at the site scale.		wood, and sediment at the watershed scale or site scale.	wood, and sediment at the watershed scale. Minor negative effects on sediment at the site scale.
Water (Channel Morphology)	63 7th field watersheds with low risk rankings, 9 with moderate and 2 with high.	Same as alternative 1 except for site-scale effects of activities in Riparian Reserves.	Same as alternative 2.	Same as alternative 2 except site-scale alterations will be less due to less activity in Riparian Reserves.	Same as alternative 4.
Water (Risk to Sediment Regimes)	51 7th field watersheds with low risk rankings, 18 with moderate and 5 with high.	Same as alternative 1 except site-scale alteration of the sediment regime due to infrastructure activities may be evident in some watersheds.	Same as alternative 2.	Same as alternative 2 except site-scale alterations will be less due to fewer temporary roads and no stream crossings.	Same as alternative 4..
Water (Risk to Temperature Regimes)	45 7th field watersheds with low risk rankings, 21 with moderate and 8 with high.	35 7th field watersheds with low risk rankings, 30 with moderate and 9 with high.	Same as alternative 2.	Same as alternative 2.	Same as alternative 2.
Soils	High Erosion Hazard Rating (EHR) on 57% of the project area; in the long-term, high EHRs would decrease to moderate except for 490 acres. Soil organic matter will remain unless severe storm events result in the loss of large amounts of topsoil. Soil structure conditions will remain the same in the short term with very slow long-term natural recovery of old skid trails and landings.	Soil stability would be affected on about 2,800 acres, surface organic matter on 825 acres, soil organic matter on 2,214 acres and soil structure on 1,255 acres. Since this is less than 10% of the project area, Forest Plan standards will be met on the project area as a whole. Legacy site treatment will improve soil stability over the long term.	Soil stability would be affected on about 2,380 acres, surface organic matter on 560 acres, soil organic matter on 1,980 acres and soil structure on 1,085 acres. Since this is less than 10% of the project area, Forest Plan standards will be met on the project area as a whole. Legacy site treatment will improve soil stability over the long term.	Soil stability would be affected on about 2,415 acres, surface organic matter on 440 acres, soil organic matter on 1,690 acres and soil structure on 1,090 acres. Since this is less than 10% of the project area, Forest Plan standards will be met on the project area as a whole. Legacy site treatment will improve soil stability over the long term.	Soil stability would be affected on about 2,560 acres, surface organic matter on 585 acres, soil organic matter on 1,974 acres and soil structure on 1,015 acres. Since this is less than 10% of the project area, Forest Plan standards will be met on the project area as a whole. Legacy site treatment will improve soil stability over the long term.
Geology	Of the 67 7th field watersheds analyzed, 3 have a very high risk, 20 have a high risk, 30 have a moderate risk and 12	Risk of landslides is the same as for alternative 1. There is a reduction in the duration of elevated risk (from 80 to 30 years)	Risk of landslides is the same as for alternative 2. Duration of elevated risk will also be reduced as in alternative 2 except that	Risk of landslides is the same as for alternative 2. Duration of risk differs in that only five watersheds will have a reduction in	Risk of landslides is the same as for alternative 2. Duration of elevated risk will be the same as for alternative 4.

	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
	have a low risk of landslides. Forty watersheds have a high to moderate vegetation burn severity with a landslide-risk duration of more than 80 years; for 27 watersheds, acute likelihood of landslides will last for two to five years.	due to planting for nine watersheds that have a high landslide risk, and a reduction in duration for three watersheds that have a moderate risk. For two watersheds that have a very high landslide risk, duration of risk is reduced from 80 to 30 years.	one of the moderate risk watersheds will not see a reduction in duration of risk in this alternative because the percentage of the watershed being planted is less than 25 percent.	duration of risk (one of the high risk watersheds and four of the moderate risk watersheds will not see a reduction in duration of risk.	
Air	No management action will emit nitrogen oxides, greenhouse gasses, or impact the visibility of the Marble Mountain Wilderness.	Emissions from mobile equipment will be about 26 tons. Emissions from prescribed burning will be about 34 tons per year, below the *de minimus* of 100 tons per year allowed. There is a very low likelihood of preventing progress of the Regional Haze Plan. The total greenhouse gas emission will be about 46,525 metric tons per year.	Same as alternative 2.	Same as alternative 2.	Same as alternative 2 except that additional acres of prescribed burning will increase, logging-related emissions will decrease, and the total effects to greenhouse emissions will be about 49,180 per year.
Recreation	A short-term effect on, or displacement of, recreation use if areas have to be closed for safety reasons. Increased short-term of use of burned areas for firewood cutting and deer hunting if areas are not closed. Long-term negative effects to dispersed camping and hiking in burned areas from loss of shade, and safety concerns from falling	No effect on recreation use is expected. Short-term negative effect from smoke and road closures or increased traffic during implementation. Short-term increase in use from firewood cutting along roads from roadside hazard treatments. Indirect short- and long-term benefits to big game hunting from prescribed fire and planting. Long-term benefits to recreation facilities from	Same as alternative 2.	Same as alternative 2.	Same as alternative 2.

	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
	snags.	fuels treatments that protect Forest Service infrastructure and increase safety.			
Scenery	No effect to meeting visual quality objectives. Long-term negative effect with vegetation change toward a shrub-dominated ecosystem. Achievement of desired scenic character would require more than 50 years.	Minor localized short-term direct negative effects to visual quality objectives during implement. “Greening up” for three years after project completion would reduce visual evidence of implementation activities. Forest Plan consistency will be met even though it will take longer than three years for visual quality objectives to be met (see Forest Plan standard 11-7 which allows a longer time in these circumstances). Indirect long-term benefits to scenic character include accelerating the recovery of burned areas through regeneration of conifers by planting.	Same as alternative 2.	Same as alternative 2.	Same as alternative 2.
Wild and Scenic Rivers	No effect to Wild and Scenic Rivers or their corridors because no action is taken.	No effect or a low risk to Wild and Scenic Rivers because none of the activities would negatively affect the outstandingly remarkable values of these rivers or their corridors.	Same as alternative 2.	Same as alternative 2.	Same as alternative 2.
Cultural Resources	No direct effects to archaeological sites. Short-term indirect effects from lack of action would be negligible but	There would be no direct effects to historic properties due to the implementation of project design features and	Same as alternative 2.	Same as alternative 2.	Same as alternative 2.

	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
	long-term would be moderate to major. No direct effects to traditional use areas will occur but fire-adapted plants that are important to tribal interests will not be enhanced in the long term without prescribed burning. Lon g-term indirect effects would be moderate to major.	standard resource protection measures under the programmatic agreement with the State Historic Preservation Office. Removal of dead and dying trees from within or adjacent to cultural resources and historic properties results in direct and indirect beneficial effects that are moderate to major in both the short and long term. The protection measures that minimize the effects of fuels reduction treatments on heritage resources may lead to indirect effects that increase likelihood of damage from future fires and direct public attention to heritage sites. These effects are minor in the short term but moderate to major in the long term.			
Socio-Economics	An unsafe condition for the public, forest workers and firefighters and for the communities adjacent to the Forest exists in the short term that would increase in risk in the long term. This alternative is not consistent with the Siskiyou County Land and Resource Management Plan that encourages resource use of the Forest. No	Safer conditions would prevail in the short term through removal of roadside hazards along 640 miles of road. Longer term, this alternative will provide safer conditions through strategic fuel breaks on ridges and fuels treatments around communities and infrastructure. Economic returns would include an output of $210 million, labor income of $53	Similar to alternative 2 except economic returns would include an output of $185 million, labor income of $46 million, and creation of 1,067 jobs. This alternative is consistent with local county objectives for resource use of the Forest.	Similar to alternative 2 except economic returns would include an output of $190 million, labor income of $47 million, and creation of 1,074 jobs. This alternative is consistent with local county objectives for resource use of the Forest.	Similar to alternative 2 except economic returns would include an output of $84 million, labor income of $22 million, and creation of 549 jobs. This alternative is consistent with local county objectives for resource use of the Forest but not as favorable as alternative 2.

	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
	economic benefits come from this alternative.	million, and creation of 1,236 jobs. This alternative is consistent with local county objectives for resource use of the Forest.			
Inventoried Roadless Areas	No action in IRAs would mean no direct or indirect effects of this alternative.	No road construction or salvage harvest will occur in IRAs. About 490 acres of site preparation and planting using hand treatment (no ground-disturbing equipment), creation and maintenance of strategic fuel breaks, and prescribed underburning are the activities that may affect the roadless character of the areas but are not likely to do so. About 4% of the roadless area that still retains a roadless character is affected by these activities and about 13% of the area that no longer retained roadless character prior to the project is affected by these activities.	Same as alternative 2.	Same as alternative 2	Same as alternative 2.

Project Design Features

The Forest developed the following project design features to address project objectives, to minimize resource impacts, and to ensure compliance with the Forest Plan and applicable laws and regulations. Table 2-35 displays the design features developed for this project, along with the applicable units. Project design features will be implemented in all action alternatives unless otherwise designated.

Table 2-35: Westside Fire Recovery Project Design Features and applicable stands and/or alternatives

Project Design Feature	Description	Applicable Alternatives and Units
Botany - 1	Forest Service botanist will flag for avoidance appropriate populations of federally Threatened and Endangered and Forest Service Sensitive species. Yellow and black striped flagging will be used to delineate population boundaries. Some specific areas may also require a limited operating period (LOP) to minimize impacts to plants.	508-1, F071, F025, F025-1, F026, F106, F106-1, F106-3, P065 LOP: F025, F025-1, F026, F106, F106-1, F106-3
Botany - 2	Populations protected under Survey and Manage guidelines will be flagged for avoidance. Yellow and black striped flagging will be used to delineate population boundaries.	F078, F162, F032, F068-1, F030, F030-2, F043-5, F146, F027-1, F146-1, F034, F034-1, F035, F035-1, F035-2, F035-3, F077, F077-1, F160-2, F019, F157, F157-2, F020, F091, F044-1, F044-2, F160, F160-2, F109, F151, F078-7
Botany - 3	Hazard trees adjacent to flagged populations of Threatened, Endangered, and Sensitive (TES) and Survey and Manage species will be directionally felled away from the flagged area to avoid disturbing the population. Directionally felled trees may only be removed if it causes no ground disturbance within the flagged area. Yellow and black striped flagging will be used to delineate population boundaries.	R136, R045, R101, R131, R127-11, R140, R140-1, R042, R115, R151, R127-4, R119, R128, R040, R093
Botany - 4	Hazard trees located within the flagged population boundary for TES or Survey and Manage species may be felled, but must be left on-site to avoid ground disturbance. Yellow and black striped flagging will be used to delineate population boundaries.	R136, R045, R101, R131, R127-11, R140, R140-1, R042, R115, R151, R127-4, R119, R128, R040, R093
Botany - 5	A Forest Botanist will be consulted prior to conducting Fuels treatments within the Lake Mountain Special Interest Area	F070, F071, F072
Botany - 6	Cultural botanical resources (fern beds in riparian zones) will be flagged for avoidance. Yellow and black striped flagging will be used to delineate population boundaries.	228, 228-1, 226-1, 226-2, P322, P319 *Units subject to field verification
Botany - 7	Equipment and vehicle travel and/or staging shall be restricted to established road surfaces.	F084-1
NNIS – 1	Equipment and vehicles that leave established road surfaces will be cleaned of soil, seeds, vegetative matter, and other debris that could contain noxious weed seeds prior to entering and before leaving the project area. Areas appropriate for cleaning equipment prior to	All equipment where applicable

Project Design Feature	Description	Applicable Alternatives and Units
	leaving the project area will be designated as appropriate. *See mandatory C-Provision 6.25	
NNIS - 2	Equipment, vehicles, and personnel will avoid working within flagged noxious weed sites. Orange/black flagging labeled with *INVASIVE SPECIES* will be used to delineate population boundaries.	1151, 1155, 508-5, 508-4, 506, 501, 500, 411, 410407, 62, 23, 005-3, F008, F075, F076, F159, F022, F013, F155, F077, F160, F015, F016, F087, F088, F084, F090, F050, F051, F053, F080, F038, F036, F044, F045, F113, F028, F152, F109, F029, F026, F037, F034, F035, F043, F078, F157, F002, F086, F081, F162, F151, F184, F030, F127, F129, F146, F121, F033, F133, F068, F069, F116, F008, F072, F071, F013, F016, F018, F022, F075, F076, F156, F159, F074, F078, F021, F017, F019, P026, P089, P099, P102, P105, P106, P107, P072, P073, P075, P113, P160, P139, P057, P058, P059, P061, P063, P065, P028, R128, R082, R127-11, R100, R136, R140, R131, R020, R024, R015, R041, R017, R132, R130, R118, R109, R102, R111, R132, R106, R082, R096, R094, R032, R017, R103, R116, R079, R137, R132
NNIS - 3	If potential landings sites are infested with noxious weeds, consult a Botanist about appropriate methods for containing and/or managing the infestation. Methods may include blading infested soil away from activity zone and covering this soil; or adding a barrier to the landing so seed banks cannot be transported.	All landings where applicable: info to date indicates the following locations: L174, L176, L177, L203, L219, L220, L223, L224, L225, L002, L005, L013, L0134, DZ03, DZ04, DZ17, L006, L007, L044, L261, L269, L048, L064, L066
NNIS - 4	Any straw or seed placed within the project area must be documented as California certified weed free. Other materials where State inspection protocol does not exist (gravel, wood chips) used as mulch in the project area, should be inspected by a Forest Service representative to determine the potential for spread of noxious weeds.	All materials where applicable
NNIS - 5	Any facility that provides material such as rock, gravel, or boulders to be used in the project area should be inspected and determined to have limited potential for the spread of noxious weeds from stored material. Material stockpiles must be noxious weed free.	All facilities where applicable
Fuels - 1	Site specific burn plan prior to implementation would be completed to identify desired fire behavior and weather conditions to meet prescribed fire and resource objectives along with protection measures to reduce impacts to both cultural and natural resources within the burn area.	All salvage harvest units
Fuels - 2	All burning activities would adhere to pertinent air quality regulations. Smoke emissions would be minimized by following Best Available Control Measures (BACM). A smoke permit	All units where applicable

Project Design Feature	Description	Applicable Alternatives and Units
	administered by the local County Air Resource Agency would accompany burn plans.	
Fuels - 3	In preparation of prescribed fire activities, perimeter control lines will be constructed to mineral soil. As needed, brush and conifer trees < 12" dbh may be cut along control lines to facilitate holding activities.	All units where applicable
Fuels - 4	All fire lines would follow the established guidelines for water bar construction as outlined in the Best Management Practices. Upon completion of burning, the visible character of the firelines would be disguised by spreading pine needles, brush, etc where they intersect roads or trails in order to reduce the likelihood of the firelines becoming unwanted trails.	All units where applicable
Fuels - 5	Piles will be covered to keep piles dry for ignition and consumption during wet periods.	All units where applicable
Fuels - 6	Prior to planting, the project silviculturist will coordinate with the fuels specialist to review planting activities within identified hazardous fuels treatments. Planting utilizing a clumping pattern with variable spacing to minimize surface fuel loadings and break the continuity of the fuel beds to maintain desired low fire hazard conditions.	All units where applicable
Fuels - 7	Areas proposed for a combination of planting and follow up prescribed fire would be assessed prior to implementation by the silviculturist and fuels specialist to assess fuel conditions and potential mortality of planted trees as a result of planned prescribed fire. Should high mortality rates of planted trees be predicted, handline or other control methods would be employed to exclude fire from these areas.	Units with ground-based logging system only
Heritage - 1	Conduct heritage resource surveys to determine presence of resources within the area of potential effects following the provisions outlined in the Regional and Westside Recovery Programmatic Agreements (PAs).	All units where applicable
Heritage - 2	Complete the Section 106 process, consulting with the State Historic Preservation Officer on potential adverse effects to sites from project activities that cannot be mitigated using Standard Resource Protection Measures (SRPM). If adverse effects cannot be avoided, a Historic Properties Treatment Plan will be developed.	All units where applicable
Heritage - 3	All sites within the area of potential effects will be clearly delineated prior to implementation. This includes but is not limited to flagging site boundaries.	All units where applicable
Heritage - 4	Any project activities within site boundaries will follow approved SRPMs established by PAs and will be approved by the heritage program manager.	All units where applicable

Project Design Feature	Description	Applicable Alternatives and Units
Heritage - 5	No skid roads, road improvements, landings or burn pile areas will occur within archeological sites without approval from the district archaeologist and/or heritage program manager.	All units where applicable
Heritage - 6	In the event that new heritage resources are discovered during project implementation, the district archaeologist and/or heritage program manager must be notified and all activities in the vicinity (150 feet) of the resource shall cease until consultations are completed.	All units where applicable
Heritage - 7	Heritage personnel will conduct implementation and post-implementation monitoring of project activities within site boundaries.	All units where applicable
Inventoried Roadless Area - 1	Site preparation and planting within Inventoried Roadless Areas will be by hand and not include ground-based mechanical equipment.	All site preparation and planting units in IRAs
Range-1	All structural rangeland improvements, such as corrals, cattle guards, and spring developments, will be mapped and protected from disturbance. If damage occurs, improvements will be repaired or replaced in a timely manner.	All units within allotments
Range-2	Timing of logging operations will be made known to the Rangeland Management Specialist in order to decrease conflicts between cattle and heavy equipment.	All Units within allotments
Range - 3	Meadows (dry or wet) shall not be used for landings, staging areas, or contractor camping. Meadows are defined as a non-forested, herbaceous opening, ¼ acre or larger with at least 50 percent herbaceous groundcover and/or riparian shrubs of alder and willow. Openings covered in ferns (*Pteridium spp.*), corn lily (*Veratrum spp.*), marlahan mustard (*Isatis tinctoria*) or other weedy species are exempt. Openings characterized by greater than 50 percent barren ground are also exempt.	1108, 1128, 1128-1, 1137, 1142, F046, F046-2, F047, F047-1, F047-2, F047-3, F048, F048-1, F048-2, F049-1, F050-1, F053, F054, F055, F056, F057, F060, F062, F082, F083, F084, F084-1, F084-3 F085, F085-1, F085-2, F085-3, F086, F087, F087-1, F089, F089-1, F089-2, F090, F095, F095-1, F095-2, F095-3, F096, F096-1, F096-2, F161, F163-1, F169, F175, F176, F178, F180, F182, P073, P083, P084, P085, P087, P088, P090, P092, P093, P094, P098, P100, P103, P110, P111, P113, P115, R001, R002, R005, R006, R007, R010, R011, R013, R015, R017, R019, R023, R025, R026, R027, R028, R030, R033, R034, R039, R040, R041, R045, R049, R050, R051, R054-1, R057, R058, R072, 022, 031, 032, 034, 508_1_1, 508-1, 508-2, 508-4, 508-4-1, 508-5, 508-6, 508-9, 515-1, 518, 528, 528-1-1, 530, 545, 546, F008, F010, F026, F063-4, F063-5, F070, F071, F072, F109, F118, F120, P036, P038, P039, P041, P042, P044, P049, P050 P052, P056, P058, P059, P060, P062, P064, P065, P066, P067, P068, P069, P070, P071, R079, R082, R111, R118, R119, R127-11, R127-9, R128, 426, F073-1, F076-6, F077-1, L019, L024, L001, L003, L013, L266, DZ21
Recreation	Protect and maintain recreational access and	All units where applicable

Project Design Feature	Description	Applicable Alternatives and Units
and Scenery-1	recreational settings along roads, trails, and trailheads identified as visually sensitive.	
Recreation and Scenery-2	Repair or replace recreational signing or other facilities and trail settings if damaged during project implementation.	All units where applicable
Recreation and Scenery-3	Provide visitor information about area/road/trail closures, or other recreation setting changes, in news releases, on-site, and on the Forest website.	All units where applicable
Recreation and Scenery-4	Minimize scenery contrasts such as stumps, landings, skid patterns, temporary roads, and burn piles in sensitive trailside and roadside foreground distances to meet assigned VQOs.	All units where applicable
Recreation and Scenery-5	No visible tree mark paint on trees after implementation in Retention VQO areas as seen from high sensitivity viewpoints.	All units where applicable
Roads - 1	Forest Road 12 will be signed from the intersection with Highway 96 to 3/8 mile past Walker Bridge; the sign will request log truck drivers to not use their “Jake Brakes” along this section of road.	Forest Road 12
Watershed - 1	The project is proposed to take place during the normal operating season (NOS) that is defined as May 1 to October 31. All ground disturbing activities, whether inside or outside of the NOS, will be implemented according to the Forest’s Wet Weather Operation Standards (Klamath National Forest, 2002).	All units where applicable
Watershed - 2	Areas where soil has been disturbed by project activities within Riparian Reserves must be stabilized prior to the end of the normal operating season, prior to sunset if the National Weather Service forecast is a “chance” (30%) of rain within the next 24 hours, or at the conclusion of the operations, whichever is sooner. This includes skid trails that cross swales (i.e. linear depressions perpendicular to the slope contour that do not meet definition for designation as a Riparian Reserve). Restoration generally consists of removing excess sediment, reshaping and waterbarring former approaches, and spreading slash on the former crossing.	All units where applicable
Watershed - 3	Project Riparian Reserves are established in the following manner per the Forest Plan (site tree for Salmon and Happy Camp districts is 170 feet, site tree for Scott and Oak Knoll districts is 150 feet): For fish-bearing streams, it is the area on each side of the stream extending from the edges of the active stream channel to the top of the inner gorge, or to the outer edges of the 100-year floodplain, or to a distance equal to the height of two site-potential trees, or 300 feet slope distance (600 feet total, including both sides of the stream), whichever is greatest. For Salmon and Happy Camp ranger districts, this will be	All units where applicable

Project Design Feature	Description	Applicable Alternatives and Units
	340 feet (680 feet total). For permanently flowing non-fish-bearing streams, it is the area on each side of the stream extending from the edges of the active stream channel to the top of the inner gorge, or to the outer edges of the 100-year floodplain, or to a distance equal to the height of one site-potential tree, or 150 feet slope distance (300 feet total, including both sides of the stream), whichever is greatest. For Salmon and Happy Camp ranger districts, this will be 170 feet (340 feet total) and 150 feet for the Oak Knoll and Scott River Ranger District. For intermittent streams, the stream channel and extending to the top of the inner gorge, or extension from the edges of the stream channel to a distance equal to the height of one site potential tree, or 100 feet slope distance, whichever is greatest. For unstable lands, it is the extent of unstable and potentially unstable areas. Consistent with Forest Plan direction, riparian reserves for wetlands and springs will be defined by the edge of the feature out to a distance equal to 1 site potential tree. These riparian reservess will be flagged and avoided during salvage harvest.	
Watershed - 4	Tractors and mechanical harvesters will be excluded from all riparian reserves associated with stream channels, active landslides, inner gorges, and toe zones of dormant landslide deposits. Hazard tree removal units are the exception. In Hazard tree units the equipment will be excluded from the inner 50 feet of the non-fish bearing riparian reserve, one site tree for fish bearing streams and in the perimeter of all active landslides and toe zones of dormant landslides. Equipment will be excluded from wetlands or wet meadows (excluding small springs and seeps). To limit slope disturbance, inner gorge terrain (> 65% slope) that extends beyond riparian reserves will be buffered by 20-foot slope distance and excluded from mechanical equipment activities. In areas where treatments may conflict, a hydrologist will be consulted.	All units where applicable
Watershed - 5	New temporary roads or landings will not be constructed in any riparian reserve associated with stream channels, on toe zones of landslides, active landslides or inner gorges. Exceptions for this project design feature for Alternative 2: Landings # DZ03, DZ10, DZ23, L043, L044, and L090.	All units where applicable
Watershed - 6	There will be no salvage logging on active landslides.	All units where applicable
Watershed -	Limit equipment disturbance within 20 feet on	All units where applicable

Project Design Feature	Description	Applicable Alternatives and Units
7	either side of swales by minimizing equipment crossings and avoiding running trails up the axis of swales, except at designated crossings.	
Watershed - 8	In salvage units and subsequent site preparation, skidding equipment will be restricted to slopes less than 35 percent. Skid trails that connect benches in dormant landslide terrain can have minor portions of the skid trails on slopes greater than 35 percent. In site preparation units (where no salvage will occur) felling and skidding equipment will be restricted to slopes less than 45% in non-granitic and non-schist soil types (see soils report for locations).	All salvage and site preparation units
Watershed - 9	Ground-based harvest equipment will be limited to 35% slopes, except when moving from one bench to another on dormant landslide terrain. In addition, ground-based equipment can travel up to 100 feet on slopes 35 to 45 percent.	All units where applicable
Watershed - 10	During site preparation, material greater than 8'' inches in diameter would not be removed unless needed to reduce 1,000 hour fuel loading to seven tons per acre, retain as close to seven tons per acre as possible.	All units where applicable
Watershed - 11	Site preparation treatments would be designed to meet soils management direction in the Forest Plan. This may include use of low ground pressure equipment, retaining slash and large woody material and implementing hand treatments instead of mechanical.	All units where applicable
Watershed - 12	All hazard trees cut within 25 feet of a stream channel will be left on site unless it continues to pose a threat to safety or accessibility (see watershed-4 for equipment exclusion restrictions). Along fish-bearing stream reaches, all hazard trees greater than 26 inches in diameter at breast height within the first site tree (150-170 feet) will be left on site unless after felling, it continues to pose a threat to safety, infrastructure, forest road drainage system integrity or accessibility.	All units where applicable
Watershed - 13	Live trees directly rooted into the banks or otherwise integral to the stability of the channel bank will not be felled unless they pose an overhead hazard and, if felled, will be left on site unless this poses a hazard on the ground per Forest Service safety requirements.	All units where applicable
Watershed - 14	Directional felling will be used to protect streambanks where hazard trees need to be mitigated for public or employee safety.	All units where applicable
Watershed - 15	Improvements to existing system roads in the project area will avoid over-steepened road cuts where possible, minimize sidecasting, and maintain ditches, cross drains, and any	All units where applicable

Project Design Feature	Description	Applicable Alternatives and Units
	outsloped road segments.	
Watershed - 16	Roads will be watered as appropriate to maintain road fines on site. Other materials may be used for dust abatement as approved by the Forest Service.	All units where applicable
Watershed - 17	Upgrades or improvements to stream crossings will be built to Forest Plan standards.	All units where applicable
Watershed - 18	Activities which require culvert replacement or removal will occur during the least critical periods for water and aquatic resources: when streams are dry or during low-water conditions; and in compliance with spawning and breeding season restrictions.	All units where applicable
Watershed - 19	Legacy sediment site treatments within or adjacent to streams will have erosion-prevention techniques applied such as silt fences, straw waddles, or mulch to minimize the risk of discharge.	All units where applicable
Watershed - 20	All project-related temporary structures, materials and project-related debris will not be stored for any length of time on active landslides and will be removed from riparian areas and stream channels prior to winter shutdown.	All units where applicable
Watershed - 21	For legacy sediment site repairs, fill materials generated will be reincorporated back into subgrade to the extent possible; all excess fill materials will be spoiled at a site reviewed and approved by Forest Service botanist, watershed, and heritage specialists.	All legacy site repair where applicable
Watershed - 22	Following harvest activities achieve at least 50 percent effective soil cover on new temporary roads and block them after the harvest season (prior to the first winter after use). New temporary roads will also be sub-soiled (or tilled) after use. All temporary roads (new, existing or re-opened decommissioned roads) will have the takeoffs from system road obliterated or blocked to avoid unauthorized use. All temporary roads will be hydrologically stabilized including removal of culverts and fills at stream crossings, out-sloping of road surfaces, and proper construction of water bars. Erosion and sedimentation control structures (water bars) will be maintained and repaired per the guidance in the Forest Service Handbook 2409.15 R5 Supplement.	New temp roads: 6, 7, 8, 10, 11, 12, 20, 27
Watershed - 23	Existing landings will be used to the extent possible. Existing landings in stream-course riparian reserves will not be expanded towards stream channels, or on to active landslides, or where vegetation that provides shade to a stream would need to be cut. Existing landings in riparian reserves will be shaped and treated for erosion control at the end of each season of use, and hydrologically restored at project	All units where applicable

Project Design Feature	Description	Applicable Alternatives and Units
	completion (including subsoiling and covering with slash/mulch as needed). Reused landings in riparian reserves will have site specific erosion control measures to reduce risk of sediment delivery into streams. During opening or construction of any landings, material will not be sidecast into intermittent or perennial stream channels. At project conclusion, landings will be configured for long-term drainage and stability by reestablishing natural runoff patterns. All landings will be covered with at least 50 percent effective soil cover. Use of certified weed free materials including straw, wood chips, or mulch may be used where on-site material is insufficient.	
Watershed - 24	Refueling will not take place within riparian reserves except at designated landings in locations where most disconnected from water resources. A spill containment kit will be in place where refueling and servicing take place.	All units where applicable
Watershed - 25	Skid trail erosion control work will be kept current during implementation. Erosion control and drainage of skid trails will be complete prior to shutting down operations due to wet weather or at project completion.	All units where applicable
Watershed - 26	Use existing skid trails instead of building new skid trails unless using existing skid trails will have greater negative effects. Space skid trails at least 75 feet apart, except near landings and where trails converge. Use no skid trails in areas in which ground-based mechanical equipment is excluded. Designation of new skid trails will be approved by a Timber Sale Administrator. Erosion and sedimentation control structure will be maintained and repaired per the guidance in the Forest Service Handbook 2409.15 R5 Supplement.	All units where applicable
Watershed - 27	No full bench skid trails will be constructed. Full bench skid trails have the entire skid trail cut into the hillslope.	All units where applicable
Watershed - 28	Locations where skid trails intersect roads will be obliterated or effectively blocked to vehicle access.	All units where applicable
Watershed - 29	Skyline corridors will be placed on the landscape as to minimize disturbance to active landslides, inner gorges and toe zones of dormant landslide deposits. All skyline and ground-based yarding will require one-end suspension in corridors and on skid trails. Corridors for skyline yarding that are parallel to the stream channel will be placed outside of the riparian reserve. The corridor may cross the stream channel with full suspension of logs within ten feet from the stream bank. Apply erosion control measures as necessary in	All units where applicable

Project Design Feature	Description	Applicable Alternatives and Units
	cable corridors to control erosion and runoff. This could include hand construction of water bars and /or spreading slash from adjacent areas.	
Watershed - 30	Where skidding occurs through units with less than 50 percent soil cover, mulch skid trails of greater than 15 percent slope, to achieve at least 50 percent effective soil cover on skid trails (approximately 40 acres across the project area may require this). Effective soil cover could include plant litter, woody material in contact with the soil, living vegetation, and rock fragments with a diameter of ½ to 3 inches. Use of certified weed free materials including straw, wood chips, or mulch may be used where on-site material is insufficient.	Based on soil burn severity data, these units are most likely to require this: 225, 264, 402, 525, 528, 540, 1109, 1129, 1136, 1140, 1142, 1151, and 1155.
Watershed - 31	Prescribed fire effects in riparian reserves will mimic a low intensity backing fire, except for handpiles where higher intensity may occur to consume pile material. Ignition of underburns will generally not occur in riparian reserves. Approval by the District Fish Biologist is needed for underburn riparian reserve ignitions.	All units where applicable
Watershed - 32	Handpiles and windrows in riparian reserves will be placed in a checkerboard pattern whenever possible (not piled directly above another). Handpiles will be less than six feet in diameter and will be more than 15 feet away from intermittent streams and 30 feet away from perennial streams.	All units where applicable
Watershed - 33	For underburning, hand-line construction in riparian vegetation shall be avoided and in general should be farther than 25 feet from stream channels. Handlines will be mitigated (waterbarred and covered with organic material) immediately following prescribed burning, when safe to do so.	All units where applicable
Watershed - 35	Draft water only at sites designated by the Forest Service. Decisions related to where water drafting occurs will be coordinated with a Forest Service fisheries biologist so that potential impacts to anadromous fish, and the thermal refugia they rely upon, are sufficiently minimized. <u>When drafting from waters designated as coho salmon Critical Habitat:</u> *NOAA Fisheries Water Drafting Specifications (2001) apply* 1. Intakes will be screened with 3/32" mesh for rounded or square openings, or 1/16" mesh for slotted openings. When in habitat potentially occupied by steelhead trout, intakes will be screened with 1/8" mesh size. Wetted surface area of the screen or fish-exclusion device shall be proportional to the pump rate to ensure that water velocity at the screen surface does not exceed 0.33 feet/second. a. Use of a NOAA approved fish screen will	All units where applicable

Project Design Feature	Description	Applicable Alternatives and Units
	ensure the above specifications are met. 2. Fish screen will be placed parallel to flow. 3. Pumping rate will not exceed 350 gallons-per-minute or 10% of the flow of the anadromous stream drafted from. 4. Pumping will be terminated when tank is full. Additional applicable specifications: • There will be no modification/improvement of drafting sites in Coho Critical Habitat. Water drafting by more than one truck shall not occur simultaneously. <u>When drafting from waters that are not Coho Salmon critical habitat, but do contain fish:</u> *Forest Service Best Management Practices (BMP) Handbook direction applies (BMP 2.5)* 1. For fish-bearing streams, the water drafting rate should not exceed 350 gallons per minute for streamflow greater than or equal to 4.0 cubic feet per second (cfs). 2. Below 4.0 cfs, drafting rates should not exceed 20 percent of surface flows. 3. Water drafting should cease when bypass surface flows drop below 1.5 cfs. 4. Intakes, for trucks and tanks, shall be placed parallel to the flow of water and screened, with opening size consistent with the protection of aquatic species of interest. 5.Fish-bearing streams that are temporarily dammed to create a drafting pool shall provide fish passage for all life stages of fish. <u>When drafting from non-fish-bearing waters:</u> *Forest Service BMP Handbook direction applies (BMP 2.5)* • Drafting rate should not exceed 350 gallons per minute for stream flow greater than or equal to 2.0 cubic feet/second. • Drafting rate should not exceed 50 percent of surface flow. • Drafting should cease when bypass surface flow drops below ten gallons per minute. • Drafting by more than one truck shall not occur simultaneously.	
Watershed – 36	Rock and gravel will be applied to drafting sites if it is needed to prevent stream sedimentation. Water drafting sites located in non-fish-bearing waters only may include minor instream modification, such as fine sediment removal and building of board/plastic dams. All boards and plastic will be removed after use. Water drafting sites located within fish-bearing stream segments may not be modified, except rocking the approach to prevent sedimentation.	All units where applicable
Wildlife – 1	A survey strategy will be developed in coordination with Fish and Wildlife Service for NSO surveys prior to project implementation. If	ALL ALTERNATIVES All units where applicable

Project Design Feature	Description	Applicable Alternatives and Units
	surveys result in a positive detection of northern spotted owl (NSO), then: • No activities that generate noise above ambient levels, such as chainsaws and heavy equipment, will occur within 0.25 mile of nest from Feb. 1 to July 9. • No underburning or treatment within nesting/roosting and foraging habitat within 0.25 mile of a nest (except roadside hazard) from Feb. 1 to Sept. 15.	
Wildlife – 2	No more than 50 percent of the suitable nesting/roosting, and foraging habitat within an occupied NSO core area and no more than 50 percent of the nesting/roosting, and foraging suitable habitat within an occupied NSO home range will be underburned annually.	ALL ALTERNATIVES All units where applicable
Wildlife – 3	No prescribed fire (e.g. underburning and pile burning) within 0.5 mile of an eagle nest from January 1 to August 31. No prescribed fire (e.g. underburning and pile burning) will be implemented within bald eagle winter roost areas from November 1 to March 31. If a survey determines that a winter roost or nest site is not active, no seasonal restrictions are required for the year.	ALL ALTERNATIVES All units where applicable
Wildlife – 4	No helicopter activity within 0.5 mile of a bald eagle roost or nest or within all of Caroline Creek (7th field watershed) from January 1 to August 31. If surveys determine that a roost or nest is not active, no seasonal restrictions are required for the year. Landings L259 and L270 (in Caroline Creek) are not subject to this LOP.	ALL ALTERNATIVES All units where applicable Landings DZ03, DZ04, DZ05, DZ10, L040 Units 037, 038, and 039
Wildlife – 5	No project activities creating noise above ambient levels (including mechanical thinning, yarding, chainsaw use, and hauling) or habitat modification within 0.25 mile of a bald eagle roost or nest from January 1 to August 31. If surveys determine that a roost or nest is not active, no seasonal restrictions are required for the year.	ALL ALTERNATIVES Units: F147, F152, F149, F152-1, F147-2, F098, F098-1, R126, R129, R132, and R102.
Wildlife – 6	A survey strategy will be developed prior to project implementation for goshawk. If survey results locate a nesting pair project activities will not occur within .25 miles of this site location from (March 1- August 31). If pre-implementation surveys determine no nesting activity, then seasonal restrictions may be lifted for the year.	ALL ALTERNATIVES All units where applicable
Wildlife – 7	No roadside treatment between March 1 and June 15 to avoid disturbance of denning fisher.	ALL ALTERNATIVES ML1 roads
Wildlife – 8	No treatment, salvage harvest, or ground disturbing activity during any time of the year in areas within units that are flagged for avoidance; as these areas contain either known sites, occupied talus habitat, or potentially occupied talus habitat for the Scott Bar	ALL ALTERNATIVES Applies to all or parts of units 517, 518, 508-8, 508-4, 508-4-1, 508-9, 508, 508-3, 508-2, 508-1, 501, 503, 506, 505, 515-1, 515-1-2, 516, 523-1, 523, and 528.

Project Design Feature	Description	Applicable Alternatives and Units
	Salamander and Siskiyou Mountain Salamander. Sites will be flagged on the ground by the project wildlife biologist.	
Wildlife – 9	Do not place skyline corridors on known sites, occupied talus habitat, or potentially occupied talus habitat for the Scott Bar Salamander and Siskiyou Mt Salamander during anytime of the year. This will apply to skyline units within the range of the Scott Bar and Siskiyou Mt Salamander that have talus habitat.	All Alternatives Applies to units 508, 508-3, 508-2, 508-1, 501, 503, 506, 505, 515-1, 515-1-2, 516, 523-1, 523, and 528.
Wildlife – 10	Avoid ground disturbance to known Survey and Manage mollusk and salamander sites during roadside hazard tree removal activities.	All Alternatives – All roadside hazard units where applicable
Wildlife – 11	Legacy Components Retention for Late Successional Habitat Retain legacy component trees and snags in treatment units. These legacy components will be identified using physical characteristics. • Legacy trees or snag size will vary depending on site condition, but are usually disproportionately large diameter trees that are often remnants of the previous stand on a given site. They are old standing trees that have persisted on the landscape after man-made and natural disturbances. For example, large trees containing one or more of the following characteristics: split or broken tops, heavy decadent branching, large mistletoe brooms, otherwise damaged to the degree that a cavity may form such as basal fire or lightning scars, or other features that indicate decay or defect. • If the legacy component tree or snag must be felled for safety reasons, retain the log whole in the unit.	ALL ALTERNATIVES All units where applicable
Wildlife – 12	Retain an average of 2 to 8 snags per acre of the largest size class in addition to the riparian reserves within treatment units >100 acres or aggregations of treatment units totaling >100 acres in size. Ideally these snags will be clumped and distributed throughout the treatment unit and situated with large, live trees where possible. Snags or dying trees that contain cat faces, broken or forked tops, hollows or cavities, burned out cavities, or those that are otherwise damaged to the degree that a cavity may form will be favored for retention. Snags left by operational constraints will count towards the snag retention. The number of retained snags will depend on slope and aspect. • On the lower 2/3 of north and east facing slopes, 5-8 snags per acre averaged across the unit will be retained. • On the upper 1/3 of north and east facing slopes, an average of 2-5 snags / acre averaged across the unit will be retained. • On all south and west facing slopes,	ALL ALTERNATIVES All units where applicable

Project Design Feature	Description	Applicable Alternatives and Units
	regardless of slope position, 2-5 snags / acre will be retained Retain all large hardwood snags or live trees where practicable, particularly those with cavities, broken or split tops, or large broken branches.	
Wildlife – 13	Retain pre-existing (existing prior to the wildfire) conifer and hardwood snags (greater than 14 inches in diameter at breast height) and pre-existing coarse woody debris in the salvage units. If any pre-existing snags must be felled for safety reasons, these pre-existing snags will be left on landscape whole as coarse wood.	ALL ALTERNATIVES All units where applicable
Wildlife – 14	Avoid placing cable corridors through retention patches or any actions that would potentially damage retention areas whenever possible.	ALL ALTERNATIVES
Wildlife – 15	Leave cull trees (greater than or equal to 20inches in diameter in roadside units where possible in whole as woody debris. Leave as whole logs where practicable.	ALL ALTERNATIVES All units where applicable
Wildlife – 16	Retain 5-8 snags per acre of the largest snags present in each of the units within the bald eagle management area in Caroline Creek and lower Grider drainage.	Portion of unit 058-2. Units: 058-1, 058-3, 058, 058-4, 058-5, 60 in bald eagle management area
Wildlife – 17	No management activities will occur within at least 0.25 mile (up to 1.0 mile) of peregrine falcon nest location from March 1 to August 31 if the nest is active. If a survey determines that a nest site is not active, no seasonal restrictions are required for the year.	ALL ALTERNATIVES Units:213 and F038,
Wildlife – 18	No helicopter flight paths within 0.5 mile (up to 1 mile) from a peregrine falcon nest location from March 1 to August 31. If a survey determines that a nest site is not active, no seasonal restrictions are required.	ALL ALTERNATIVES Units:214 and L237
Wildlife – 19	No salvage in units associated with NSO core areas that have been identified as having "Moderate potential" for contributing to the demographic support of the NSO population in the analysis area. Some units are exceptions to this and are accounted for in the list of affected units.	Alternative 3 415-1 and 420 1217, 1129-1, 1129, 1136, 1140, 1135,1217, 23-3, 23-6, 005-11, 54, 57-1, 240, 239, 214, 218, 267-1, 264, 531, 533
Wildlife – 20	Defer treatment in all salvage units less than 20 acres.	Alternative 3 Units: 1, 4, 6, 10, 35, 202, 204, 207, 210, 214, 215, 217, 218, 219, 221, 222, 223, 225, 230, 233, 235, 236, 240, 244, 268, 402, 403, 416, 418, 420, 516, 518, 531, 532, 1108, 1138, 1155, 1217, 004-1, 200-1, 212-1, 216-1, 235-1, 235-2, 236-1, 508-6, 55-1, and 55-2

Alternatives Considered but Eliminated from Detailed Study

Federal agencies are required to rigorously explore and objectively evaluate all reasonable alternatives and to briefly discuss the reasons for eliminating any alternatives that were not developed in detail (40 CFR 1502.14). Public comments received in response to the proposed action provided suggestions for alternative methods for achieving the purpose and need. Some of these alternatives may have been outside the scope of the need for the proposal, duplicative of the alternatives considered in detail, or determined to be components that would cause unnecessary environmental harm. Therefore, a number of alternatives were considered, but eliminated from detailed consideration for reasons summarized below.

Alternative A

This alternative was developed in response to a report that offers "a scientific framework of principles and practices that are provided to guide development of federal policy concerning wildfire and salvage logging and other post-fire treatments" (Beschta 1995) and includes recommendations on post-fire practices. The recommendations and how they are addressed are displayed in table 2-36.

Table 2-36: Recommendations of the 1995 Beschta report and how each is addressed by alternatives in the Westside Fire Recovery project

		Recommendations:	Addressed by:
1. Prohibiting salvage logging in sensitive areas (as defined by (a) through (f)	(a)	severely burned areas (soil burn severity)	Alternative 1 will not salvage in severely burned areas. Action alternatives (2 through 5) minimize negative effects of salvage through implementation of watershed project design features. See also response to relevant issue #1. Alternative 4 responds to this issue.
	(b)	erosive soils and any site where accelerated erosion is possible (soils with very high erosion hazard ratings)	Alternative 1 will not salvage on erosive soils or sites where accelerated erosion is possible. Action alternatives (2 through 5) minimize negative effects of salvage through implementation of watershed project design features. See also response to relevant issue #1. Alternative 4 responds to this issue.
	(c)	fragile soils (those that have physical, chemical, or biological limitations that reduce ability to recover after disturbance: schist, granitic, and serpentine)	Alternative 1 will not salvage on fragile soils. Action alternatives (2 through 5) minimize negative effects of salvage through implementation of watershed project design features. See also response to relevant issue #1. Alternative 4 responds to this issue.
	(d)	roadless areas	None of the alternatives propose salvage harvest within inventoried roadless areas so all alternatives meet the Beschta recommendations. See also response to relevant issue #3. Alternative 5 responds specifically to this issue.
	(e)	riparian areas	No salvage harvest is proposed for hydrologic (stream-side) riparian areas (reserves) as delineated in watershed project design features. No salvage is proposed for geologic riparian reserves in alternative 1. Action alternatives (2 through 5) minimize negative effects of salvage through implementation of watershed project design features. See also response to relevant issues #1 and #3. Alternatives 4 and 5 respond to these issues as does the refined alternative 2.

Recommendations:	Addressed by:
(f) steep slopes	Alternative 1 will not salvage on steep slopes. Action alternatives (2 through 5) minimize negative effects of salvage through implementation of watershed project design features that limit the slopes on which salvage will occur. See also response to relevant issue #1. Alternative 4 responds to this issue.
2. Limitations aimed at maintaining species and natural recovery processes should apply to areas suitable for salvage (a) Leave at least 50% of standing dead trees in each diameter class (b) leave all trees greater than 20 inches diameter at breast height or older than 150 years (c) Generally, leave all live trees	Alternative 1 maintains natural recovery process in 100% of the project area. Action alternatives (2 through 5) maintain natural recovery on from 88% of the project areas (alternative 2) and 89% (alternatives 3 and 4) to 96% (alternative 5). Action alternatives generally retain all live trees (with 70% or greater chance of living) in salvage units. Removal of snags is governed by project design features; all action alternatives minimize negative effects of salvage on maintaining species through implementation of wildlife project design features. See also response to relevant issue #2. Alternative 3 responds to this issue.
3. Prohibit new road building in the burned landscape.	Alternative 1 does not propose building any new roads. Action alternatives (2 through 5) do not build any new National Forest Transportation System (permanent) roads. New temporary roads are proposed from 23 miles (alternative 2) to 4 miles (alternative 4) Alternative 4 limits new temporary roads. All action alternatives minimize negative effects of new temporary roads through implementation of project design features. See also response to relevant issue #1. Alternative 4 responds to this issue.
4. Limit active reseeding and planting.	None of the alternatives include active reseeding of grasses or use of pesticides, herbicides or fertilizers. Alternative 1 proposes no planting. Action alternatives (2 through 5) propose planting of native tree seedlings where viable seed sources are lacking on from 12% of the project areas (alternative 2) to 4% (alternative 5). All action alternatives minimize negative effects of planting through planting specifics (diversity of species to be planted, spacing, trees per acre, etc.) and by implementation of project design features. See also response to relevant issue #2. Alternative 3 responds specifically to this issue. Alternative 5 addresses this recommendation by limiting planting to matrix lands.
5. Discourage structural post-fire restoration	None of the alternatives include “hard” structures such as sediment traps, fish habitat alterations or bank stabilization. Alternative 1 proposes only natural post-fire restoration. Action alternatives (2 through 5) include repair of legacy sites such as too small culverts in areas agreed-upon with the State of California Water Board. Project design features for action alternatives include provision of large woody debris. All action alternatives minimize negative effects through implementation of project design features.
6. Support research efforts needed to address ecological and operational issues	This recommendation is beyond the scope of this project. The effects of both fine and large fuels on the probability of re-burn, and relevant scientific literature concerning this topic, are addressed for all action alternatives in chapter 3 and the related Fire and Fuels resource report.

Recommendations:	Addressed by:
7. Educate the public regarding natural fires and post-burn landscapes	This recommendation is beyond the scope of this project. chapter 3 compares the effects of allowing natural regeneration of the project area (alternative 1) to the effects of active regeneration alternatives (2 through 5) and makes this comparison available to the public.

The comment letter on which this alternative is based seeks an alternative that includes all of the above recommendations.

Specifically prohibiting salvage logging in all areas defined by Beschta as sensitive will limit the Forest Service's ability to meet the purpose and need for action. Other alternatives respond to the exclusion of salvage in one or more sensitive areas. The refined proposed action (alternative 2) and alternatives to the proposed action respond to recommendations 2 through 8 that are within the scope of the project. All action alternatives include implementation of project design features to minimize negative impacts, making it redundant to analyze this alternative in detail so it was eliminated from detailed study.

Alternative B

This alternative was developed to respond to a request for specific treatments, and limitation on other treatments, and additional or modified project design features to minimize or eliminate negative effects as noted and addressed in table 2-37.

Table 2-37: Recommendations on specific treatments and how each is addressed by alternatives in the Westside Fire Recovery project

Recommendation:	Addressed by:
1. No timber harvest from Scenic River viewsheds unless there is an overlap with WUI or within ¼ mile of private property	Alternative 1 proposes no treatment in Scenic River corridors. Alternatives 2 through 5 propose no salvage harvest units within a Scenic River corridor. All action alternatives minimize negative effects of treatments through implementation of project design features. Alternatives 1 through 5 respond to this issue.
2. Re-plant with a mix of conifer species suitable the area to increase vegetative diversity	Alternative 1 does not propose any planting. Action alternatives (2 through 5) propose replanting with a mix of conifer species suitable to the area to increase vegetative diversity, and encourage the natural regeneration of hardwoods where they exist, as specified in chapter 2 (see also the response to item #4 under alternative A). All action alternatives minimize negative effects through implementation of project design features. See also response to issue D. Alternatives 2 through 5 respond to this issue.
3. Analyze the entire project area for prescribed burning opportunities	Alternative 1 proposes no prescribed burning. Action alternatives (2 through 5) analyzed opportunities for prescribed burning on the entire project area and proposed such treatments on up to 11,400 acres. All action alternatives minimize negative effects by implementation of project design features. Alternatives 2 through 5 respond to this issue.
4. Schedule future prescribed burns in strategic fire-control areas every 3-5 years	Alternative 1 does not include prescribed burns. Scheduling future prescribed burns in strategic fire-control areas every three to five years is beyond the scope of this project. Action alternatives (2 through 5) schedule prescribed burns in strategic fire-control areas five to seven years after implementation of the project begins.
5. Establish long-term management plans for plants important to the Karuk tribe	Long-term management plans are beyond the scope of this project. Culturally-important plants within the spatial and temporary boundaries of the project area are addressed in alternative F. Effects of alternatives on these plants are disclosed for all action alternatives in chapter 3 and

Recommendation:	Addressed by:
	through implementation of heritage project design features.
6. Use contour felling of snags to reduce sedimentation of important anadromous fish streams	Alternative 1 does not propose felling any snags. Action alternatives 2 through 5 include measures to reduce sedimentation in important anadromous fish streams, including contour felling, through the implementation of watershed project design features. See also response to relevant issue #1. Alternative 4 responds specifically to this issue.
7. Incorporate large woody debris into stream channels	Alternative 1 will provide large woody debris in stream channels as dead and dying snags fall. Action alternatives 2 through 5 incorporate large woody debris into stream channels through implementation of watershed project design features. See also response to relevant issue #1. Alternative 4 responds specifically to relevant issue #1.
8. In areas with highly erosive soils, plant on the bottom 1/3 of the slope	Alternative 1 does not propose planting in any areas. Action alternatives 2 through 5 minimize negative impacts to highly erosive soils through implementation of watershed project design features. Specific information on planting on erosive soils is provided in chapter 2.
9. Design sediment catchment ponds so they do not retain water in the summer months	This recommendation is beyond the scope of this project. No catchment ponds are included as part of this project.
10. Maintain and/or construct shaded fuel breaks along strategic ridgelines and roads;	Alternative 1 does not propose constructing or maintaining shaded fuel breaks. Action alternatives include constructing or maintaining fuel breaks along strategic ridgelines and roads as described in chapter 2.
11. Manage ridge lines for fire-resilient and less flammable botanical communities	Alternative 1 does not propose managing ridge lines for fire-resilient botanical communities. Action alternatives include planting a variety of species in a mosaic to foster less flammable botanical communities on areas proposed for planting as described in chapter 2. Strategic ridgelines will be managed as open, shaded fuel breaks as described in chapter 2.
12. Collaborate with adjacent private landowners prior to deciding on recovery activities	Collaboration with adjacent landowners is an important part of this project. The refined proposed action (alternative 2) and alternatives to the proposed action are based on collaboration with adjacent landowners as described in chapter 1.
13. Collaborate on site-specific prescriptions in the WUI	Collaboration on site-specific prescriptions in the WUI is part of this project. The refined proposed action (alternative 2) and alternatives to the proposed action are based on collaboration with residents in the WUI and the Community Wildfire Protection Plans of communities within the project area as described in chapter 1.
14. Promote principles of Adaptive Ecosystem Management and collaborate on studies of different recovery activities	Promoting adaptive ecosystem management and collaborating on studies of different recovery activities are beyond the scope of this project but can be considered as part of future projects or programs on the Forest. The draft EIS includes different recovery actions in different alternatives; the effects of these actions are disclosed in chapter 3.

The comment letter on which this alternative is based seeks an alternative that includes all or most of the above recommendations. Many of these recommendations are consistent with the refined proposed action (alternative 2) and with other action alternatives.

Since recommendations that can be addressed (are not beyond the scope of this project) are either consistent with the refined proposed action or an action alternative, developing an alternative to meet all of these recommendations would be redundant. For these reasons, this alternative is eliminated from detailed study.

Alternative C

This comprehensive alternative was developed to respond to recommendations for specific treatments to reduce environmental impacts, especially in specific locations, that are listed and addressed in table 2-38.

Table 2-38: Recommendations on specific treatments and locations, and how each is addressed by alternatives in the Westside Fire Recovery project

Recommendation:	Addressed by:
1. Only fell roadside hazard trees that are 100% dead and less than 45 inches DBH	Confirming that trees are 100% dead is only possible if the trees have fallen to the ground; waiting for this to happen will not meet the safety-related purpose and need for the project. Safety is the major reason on which the 60% certainty of mortality for roadside hazard trees is chosen, as disclosed in chapter 2. Few of any of the roadside hazard trees are greater than 45 inches DBH; if trees of this diameter are safety hazards, they will not be left standing in any action alternative. Alternative 1 will not cut and fell any trees.
2. No green-tree removal in recovery prescriptions	None of the alternatives in this project propose green-tree removal. Green trees are defined as those with a 70% or better chance of surviving as discussed earlier in chapter 2. Some of the trees to be removed in all action alternatives include some green needles or leaves; however, the trees have a 70% or greater chance of dying and becoming part of the fuel accumulation on the ground in the short term.
3. Increase funding for fuels reduction and prescribed fire within the CWPP and WUI areas	This recommendation is beyond the scope of this project.
4. Post fire management in the Grider Creek Watershed should protect and promote critical wildlife and fisheries habitat	All alternatives protect and promote critical wildlife and fisheries habitat by implementation of wildlife and watershed project design features. See also relevant issues #1, #2 and #3, Alternatives 3 and 4 respond specifically to these issues.
5. Severely burned plantations should be reviewed for best management and suitability for future planting	Severely burned plantations were reviewed for best management and suitability for planting in all action alternatives as described earlier in chapter 2.
6. Jobs associated with these efforts should be prioritized to regional contractors and laborers when feasible	This recommendation is beyond the scope of this project, and contrary to law, policy and regulation.
7. Use strategic fuels reduction and prescribed fire in order to return to fire-adapted and ecologically resilient landscapes	Alternative 1 does not propose any fuels reduction. Action alternatives 2 through 5 all propose strategic fuel breaks and prescribed fire as well as other fuel reduction practices as described earlier in chapter 2. Implementation of project design features will minimize potential negative effects.

The comment letter on which this alternative is based seeks an alternative that includes all of the above recommendations. Many of these recommendations are consistent with the refined proposed action (alternative 2) and with other action alternatives.

Reasons are provided above as to why following the first recommendation is not practicable. Since recommendations that can be addressed (are not beyond the scope of this project) are either consistent with the refined proposed action or an action alternative, developing an alternative to meet all of these recommendations would be redundant. For these reasons, this alternative is eliminated from detailed study.

Alternative D

This alternative was developed in response to comment letters which request specific project design features be implemented to minimize negative impacts. Recommended project design features and the way they are addressed are displayed in table 3-39.

Table 2-39: Recommendations on additional project design features and how each is addressed by alternatives in the Westside Fire Recovery project

Recommendations:	Addressed by:
1. No new roads, permanent or temporary	None of the alternatives in the project propose new permanent (system) roads. Alternative 1 proposes no new temporary roads. Action alternatives implement project design features to minimize potential negative impacts of new temporary roads. Action alternatives differ in the number and location of new temporary roads. In response to relevant issue #1, alternative 4 limits the number and location of temporary roads to further reduce impacts.
2. No tree planting units, allow for natural reseeding	Alternative 1 does not propose any tree planting. Action alternatives 2 through 5 allow for natural reseeding where seed sources are available, and propose tree planting in other areas, as described earllier in chapter 2. The effects all alternatives are summarized in chapter 2, and disclosed and compared in chapter 3 of this document. Implementation of project design features minimizes negative impacts of planting. See relevant issue #3 for further suggestions on limiting planting; alternative 5 responds specifically to this issue.
3. No helicopter units	Alternative 1 does not propose any helicopter units. Action alternatives 2 through 5 include different numbers of helicopter units as discussed earlier in chapter 2. The effects of various numbers of helicopter units are disclosed in chapter 3.
4. No logging in stands that sustained less than 70% mortality	The reasons for using the 50% mortality of a stand before it will be considered for harvest, and the analysis on which this percentage is selected, are provided earlier in chapter 2. Changing the percentage of mortality used to determine if logging can take place will have little effect on determining which units can be logged. Relevant issue #2 expresses disagreement about the effects of the proposed action on wildlife habitat and connectivity. Alternative 3 addresses this issue specifically; in doing so, the mortality of stands is included in reasons for proposing elimination of stands from salvage logging as described earlier in chapter 2.
5. No salvage logging at elevations above 6,000 feet	Alternative 1 proposes no salvage logging. Action alternatives use different criteria for determining which units are proposed for salvage logging, but the specific criteria of elevation is not included. Implementation of other criteria restricts the amount of salvage proposed above 6,000 feet. Implementation of project design features minimizes negative impacts of salvage logging at all elevations.
6. No salvage units on slopes exceeding 60%	Alternative 1 does not propose any salvage units. Action alternatives 2 through 5 minimize negative effects of salvage through implementation of watershed project design features which include those that limit equipment use of slopes over 35 to 45 percent.
7. Burn all activity generated slash	Treating activity slash for action alternatives (2 through 5) is discussed earlier in chapter 2. Treatments proposed for activity slash include burning and other treatments as noted in project design features.
8. Retain biological legacies such as large live trees, large snags, coarse woody debris and intact thickets of unburned vegetation in falling and yarding operations	Alternative 1 will retain all biological legacies. Action alternatives 2 through 5 will retain large live trees and intact thickets of unburned vegetation. Snags and coarse woody debris will be retained to meet Forest Plan standards in all action alternatives through implementing project design features. Relevant issue #2 is based on public comments on retention of these legacies. Alternative 3 responds specifically to this issue.

Recommendations:	Addressed by:
9. Retain adequate large downed wood for slope stability and regeneration	Alternative 1 retains all downed wood. Action alternatives 2 through 5 retain downed wood as specified earlier in chapter 2 and through implementing project design features. See also relevant issue #2 and alternative 3.
10. Leave a minimum of 70% of coarse woody debris parallel to topographical lines to abate water run-off and erosion	Alternative 1 retains all coarse woody debris. Action alternatives 2 through 5 retain coarse woody debris as specified earlier in chapter 2 and through implementing project design features. See also relevant issue #1 and alternative 4.
11. Leave up to 25 snags per acre, especially those with broken or forked tops, complex branching patterns, cat faces or fire damage that provide cavity nesting habitat. Consider the retention of snags in aggregates	Alternative 1 retains all snags. Action alternatives 2 through 5 retain snags in clumps as required by the Forest Plan and specified earlier in chapter 2 and through implementing project design features. See also relevant issue #2 and alternative 3 for additional retention of snags.
12. Retain the largest live trees and snags in all salvage units	All alternatives retain all live trees in salvage units as discussed earlier in chapter 2 and in response to item 2 in alternative C (table 2-38). Alternative 1 retains all trees and snags. Action alternatives 2 through 5 retain snags as required by the Forest Plan and specified earlier in chapter 2; snags are retained through implementing project design features. See also relevant issue #2 and alternative 3 for additional retention of large snags.
13. Retain all trees with green foliage	All alternatives retain all live trees (those with more than a 60% of surviving (for roadside hazard) and 70% chance of surviving (for salvage) as discussed earlier in chapter 2. Alternative 1 retains all trees with green foliage. Action alternatives 2 through 5 retain trees as specified earlier in chapter 2 and through implementing project design features. See also relevant issue #2 and alternative 3 for additional retention of trees with green foliage.

The comment letters on which this alternative is based seek an alternative that includes all of the above recommendations. Some of these recommendations are consistent with the refined proposed action and alternatives. For those recommendations, this alternative is redundant because other alternatives address the recommendations. Some of the recommendations do not help achieve the purpose of the project; therefore, this alternative is not considered in detail as a whole because it will not meet all of the purpose and need for the project.

Alternative E

This alternative was developed in response to comments that request the exclusion of specific areas or habitats from mechanical treatment. Recommended exclusions are listed and addressed in table 2-40.

Table 2-40: Recommendations for the exclusion of specific areas and how each is addressed by alternatives in the Westside Fire Recovery project

Recommendations:	Addressed by:
1. No salvage logging or planting in inventoried roadless areas (IRAs), including the Grider,	None of the alternatives propose salvage logging in inventoried roadless areas. Alternatives 1 and 5 do not include planting in IRAs. Alternatives 2 through 4 include about 490 acres of site preparation and planting in IRAs; both will be accomplished by hand and no ground-disturbing mechanical

	Recommendations:	Addressed by:
	Tom Martin, Russian, Snoozer, Kelsey, or Johnson Roadless Areas	equipment will be used. An IRA project design feature minimizes negative impacts of planting on roadless characteristics.
2.	**No salvage logging on sensitive soils, active landslides, earthflows and other erosive soil types**	Alternative 1 does not propose salvage logging in any area. Action alternatives 2 through 5 implement watershed project design features to minimize or eliminate negative impacts from salvage logging. Relevant issue #1 is based on comments concerning effects of salvage logging on watershed health; alternative 4 responds specifically to this issue.
3.	**No salvage units on decomposed granite**	Alternative 1 does not propose salvage logging in any area. Action alternatives 2 through 5 implement watershed project design features to minimize or eliminate negative impacts from salvage logging. Relevant issue #1 is based on comments concerning effects of salvage logging on watershed health (including soils); alternative 4 responds specifically to this issue.
4.	**No salvage units in Riparian Reserves**	None of the alternatives propose salvage units in hydrologic riparian reserves (reserves defined by proximity to water). Alternative 1 does not proposed any salvage. Action alternatives 2 through 5 propose various acreages of salvage on geologic riparian reserves (reserves defined by active landslides, inner gorges and toe zones of dormant landslides). These action alternatives implement watershed project design features to minimize or eliminate negative impacts from salvage logging on geologic riparian reserves. Relevant issue #1 is based on comments concerning effects of salvage logging on watershed health (including riparian reserves); alternative 4 responds specifically to this issue.
5.	**No salvage in Special Habitat designations including: goshawk territories; northern spotted owl activity centers Bald Eagle and Peregrine falcon management areas; and critical habitats**	Alternative 1 does not propose salvage logging in any area. Action alternatives 2 through 5 implement wildlife project design features to minimize or eliminate negative impacts from salvage logging. Relevant issue #2 is based on comments concerning effects of salvage logging on wildlife; alternative 3 responds specifically to this issue.
6.	**No salvage in designated or recommended Wild and Scenic River corridors**	Alternative 1 does not propose salvage logging in any area. None of the alternatives propose salvage logging in designated or recommended Wild River corridors or Scenic River corridors. Action alternatives 2 through 5 implement project design features to minimize or eliminate negative impacts from salvage logging in Recreational River corridors.
7.	**No Salvage in endemic conifer stands composed of foxtail pine, Baker's cypress, or Brewer spruce**	Alternative 1 does not propose salvage logging in any area. Action alternatives 2 through 5 include prescriptions for the choice of salvage units as discussed earlier in chapter 2.

The comment letters on which this alternative is based seek an alternative that includes all of the above recommendations. Although these recommendations are for "no salvage" in many areas, the revised proposed action (alternative 2) and alternatives include more project design features to minimize negative effects of salvage than the proposed action as scoped included. Proposing "no salvage" will not meet the purpose and need of the project. The recommendation for no salvage in inventoried roadless areas and in hydrologic riparian reserves is met by other alternatives (and thus is redundant). Therefore, this alternative will be eliminated from detailed study.

Alternative F

This alternative was developed in response to recommendations to meet historic and pre-European settlement conditions in the project area and respond to tribal concerns. Recommendations and the way they are addressed are displayed in table 2-41.

Table 2-41: Recommendations to meet tribal concerns and how each is addressed by alternatives in the Westside Fire Recovery project

	Recommended:	Addressed by:
1.	**Consider all vegetation cover in stocking estimates including: grass, shrubs, other herbaceous plants, and hardwood tree species**	Alternative 1 does not propose any actions that will affect stocking estimates. Action alternatives (2 through 5) propose replanting with a mix of conifer species suitable to the area to increase vegetative diversity, and encourage the natural regeneration of hardwoods where they exist, as specified earlier in chapter 2 (see also the response to item #4 under alternative A). Stocking estimates will include hardwood tree species where they exist. Alternatives 2 through 5 respond to this issue.
2.	**Plant conifers only where there is a historical basis for establishing a forested landscape**	Alternative 1 does not propose any planting. Action alternatives (2 through 5) propose replanting with a mix of conifer species suitable to the area to increase vegetative diversity; the species mix is based on historic conditions and suitability as specified earlier in chapter 2 (see also the response to item #4 in alternative A). Alternatives 2 through 5 respond to this issue.
3.	**Encourage natural regeneration and succession whenever possible**	Alternative 1 maintains natural recovery regeneration and succession in all areas. Action alternatives (2 through 5) maintain natural regeneration and succession on from 88% of the project areas (alternative 2) to 96% (alternative 5). All action alternatives mimic natural regeneration by planting species suitable to specific areas as described earlier in chapter 2 and by encouraging the growth of species such as hardwoods where they exist. Planting prescriptions are based on historic unit conditions, projected unit composition, and the likelihood of long-term survivability of project units within a fire ecosystem. Overall, species considered for planting in the project area include Douglas-fir, sugar pine, ponderosa pine, incense cedar, white fir, and red fir. A mosaic distribution will be achieved over time due to the spatial variability achieved by micro-site selection for planting. Conifers will not be planted next to green hardwoods; these hardwoods will be included in average spacing. Seedlings will be widely spaced on poorer sites including southerly aspects and/or rocky soils. Trees will be planted in clusters to achieve groups of conifers throughout the landscape to mimic natural units. Seedling survival rates and competition from brush species will create a natural mosaic of species and stocking densities. In order to effectively reforest these units, an average of 130 to 300 trees per acre will be planted to achieve acceptable levels of stocking, depending on site conditions. Initial planting spacing recommendations considered Forest Plan land management objectives for projected stocking needs, and the likelihood of achieving those objectives, for each unit evaluated for reforestation. Planting conifers in historically forested areas does promote faster reforestation (see the Vegetation section of this document for information on the scientific evidence that supports this conclusion). Areas were considered for site preparation, planting and release if they met the conditions listed earlier in chapter 2 for site preparation and planting.
4.	**Count natural hardwood regeneration in stocking requirement goals**	Action alternatives (2 through 5) include hardwoods in stocking requirement goals where they exist as specified earlier in chapter 2 (see also the response to recommendation #1 above). Alternatives 2 through 5 respond to this issue.
5.	**Review 1944 aerial photos and Wieslander maps to ascertain historic vegetation to shape desired condition**	The available 1944 aerial photographs and Wieslander maps for portions of the project were used to help ascertain historic vegetation as described earlier in chapter 2.
6.	**Minimize the connectivity of fuels throughout the development of the planted stand**	Alternative 1 does not include any actions to minimize the connectivity of fuels. Action alternatives 2 through 5 propose activities for reduction of fuels connectivity as described earlier in chapter 2.

Recommended:	Addressed by:
7. Facilitate the application and restoration of cultural burning practices and establish areas available for managing fires for resource benefits	Alternative 1 does not include any actions to facilitate the restoration of cultural burning practices or establish areas available for managing fires for resource benefits. Action alternatives 2 through 5 propose activities, such as fuel break construction and maintenance, that will help to make areas available for managing fires for resource benefits and prescribed burning to emphasize the restoration of culturally important plants as described earlier in chapter 2.
8. Protection of infrastructures to a 500 foot radius	Alternative 1 does not include any actions to protect infrastructure. Action alternatives 2 through 5 propose activities to protect infrastructure as described earlier in chapter 2. As described, a 200- to 250-foot radius around infrastructure is proposed for fuel reduction treatments in all action alternatives.
9. Roadside hazard tree treatment with a 150-300 foot buffer	Alternative 1 does not include any roadside hazard treatment. Action alternatives 2 through 5 propose roadside hazard treatment of trees that fit the “hazard tree” definition as described earlier in chapter 2. A 200-foot buffer on either side of the road is used to estimate acreage being treated but the actual distance from the road will vary based on regional hazard tree guidelines (Angwin et al. 2012).
10. Protection of private property	Alternative 1 does not include any treatments to protect private property. Action alternatives 2 through 5 propose fuel reduction actions within 1/4 mile of private property as described earlier in chapter 2. Alternative 5 includes more fuels reduction units than other action alternatives to protect private property.
11. Support and foster early seral conditions	Most of the project area will not be salvaged; none of the action alternatives include more than 11,700 acres of salvage units and only 6,800 acres of these will be salvage logged because salvage units include areas that will continue to be in early seral conditions (such as Riparian Reserves, clumps of snags that will be left for wildlife habitat, and areas of trees that have a 70% chance or better of surviving). Overall, more than 85% of the project area will be allowed to regenerate naturally; much of this will remain in early seral conditions.
12. No ground-disturbing activities should be planned in inner gorges, previously active landslides and older landslide deposits.	There are about 3,900 acres of salvage units proposed on steep, weathered granitic lands (geologic Riparian Reserves) in the proposed action as scoped; in refined alternative 2, salvage is proposed on geologic Riparian Reserves on about 2,000 of the 3,900 acres of salvage units and other action alternative propose the same amount or less. No salvage will occur on inner gorges, active landslides or toe zones of dormant landslides through implementing project design features displayed in chapter 2 of this DEIS. About 960 acres of site preparation and planting, up to 4,400 acres of roadside hazard tree removal, and 3,900 acres of fuel hazard treatments are proposed on unstable lands considered to be geologic Riparian Reserves. The landslide risk does not increase in any action alternative from the current situation.
13. Concern about the amount of roadside hazard, especially around management level 1 and 2 roads, and impacts to fisheries.	Alternative 4 is designed to reduce watershed disturbance and impacts of water quality and fisheries relatively to the proposed action as scoped. Alternative 4 will reduce or eliminate temporary road actions, especially within key watersheds as identified by the Forest Plan. The most sensitive 7th field watersheds to further ground disturbance are identified, based on existing watershed condition and the distribution of federally-listed (as threatened or endangered) and Forest Service sensitive species of fish. Within these most sensitive watersheds, restrictions or mitigations to minimize negative impacts are proposed as project design features. Due to the implementation of project design features and relevant Best Management Practices, negative effects to special status aquatic species, including fisheries, will be minimized. More information on the specifics of this alternative are displayed earlier in chapter 2.

Recommended:	Addressed by:
14. Emphasize fuels treatments over salvage.	There is a need for the project to include receipts from treatments to be economically viable and help pay for fuels treatments. Strategic fuels treatments are proposed in all action alternatives, and salvage logging helps treat fuels on the acres on which it is implemented. Treatments specifically to treat hazardous fuels are proposed on almost twice as many acres as are in salvage logging units and almost four times as many acres as will be salvage logged in any action alternative.
15. Find ways to not exclude future prescribed burning in the plantations.	Prescribed burning will be included where possible in plantations, preferably when trees are a size to survive prescribed fire.
16. The project should include a research component.	The project is based on the results of research but meeting the purpose and need of the project does not include research.
17. Enhance hydrologic function.	Legacy sediment site treatments are included in action alternatives that will ensure that temporary access will be hydrologically restored; alternative 4 proposes additional treatment modifications to address this concern. All temporary roads will be closed and hydrologically stabilized according the project design features in table 2-35. Both new and existing landings will be hydrologically stabilized after use. All landings will be located according the project design features. The portion of Elk Creek within the project area contains almost 150 legacy sites. Most of the legacy sites are located on or adjacent to the Forest transportation system roads. The other legacy sites are located on existing landings or roadbeds (historic roads, abandoned temporary roads, or decommissioned roads). Temporary road and landing construction, and to a lesser degree salvage harvest and associated mechanical yarding resulting from the proposed action as scoped, have potential to further increase runoff in the project area. However, modelled results of the effects of action alternatives do not show any additional disturbance beyond 2014 fire effects for broad-scale 5th field watersheds and add only minor incremental increases to risk at small scales (7th field watersheds). Any project action alternative that includes ground-disturbing activities in the above-listed watersheds will ensure that project design features and watershed restorative actions are adequate to mitigate potential erosion and sedimentation and resulting impacts to water quality and beneficial uses. Additionally the restorative activities of legacy sediment site repairs, planting and fuels reductions will help to balance the activities that may have a negative impact to water.
18. No new roads, including temporary roads	No new system roads are proposed in any alternative. Action alternatives propose different mileage of temporary roads to meet the objectives of each alternative.
19. Retain/plant drought-resistant trees suitable for climate change	Trees are selected for planting that are likely to survive if climate change predictions are fulfilled.
20. Retain all green trees at harvest	Green trees are retained in the action alternatives; green trees will not be removed unless their removal is needed for safe implementation of the project (for instance, placement of cable lines for skyline harvest).
21. Prescribed burning plans with existing control lines and features	The primary locations of fuels management zones are strategic ridge systems used to contain the 2014 fires as well as being historic fire lines from previous large fires within the project area. The treatments aim to maintain existing control lines by removing all dead vegetation and live understory vegetation along with live conifer trees less than 12 inches in diameter at breast height.
22. No planting within low or moderate burned severity	Planting within salvage units will only be in areas that burned with moderate to high severity and vegetation mortality (greater than 50 percent of the trees are fire-killed on a unit level, based on Rapid Assessment of Vegetation Condition after Wildfire (RAVG) information). Site preparation, planting and release of areas outside salvage units will be focused in areas of high and moderate vegetation morality where overhead hazards can be mitigated without allowing mechanized equipment into Riparian Reserves.

Recommended:	Addressed by:
23. Set aside areas that are un-salvaged	Many areas are set aside and not salvaged. More than 85% of the project area is not within any salvage or roadside hazard removal unit, and more than 90% will not be salvaged. Roadside hazard removal will take place along 640 miles of road in most action alternatives (610 miles in alternative 4) but only a small fraction of the roadside acreage will have hazard trees removed. Only the trees that meet hazard tree guidelines will be cut and felled.
24. Do not salvage where rare habitat has been burned.	Rare habitats are identified in the Forest Plan as either Research Natural Areas of Special Interest Areas. No salvage will occur in these areas in any alternative.
25. Leave sufficient coarse woody debris (CWD) and snags	Project design features provide for sufficient coarse woody debris and snags.
26. Avoid treatment in Riparian Reserves; promote large wood recruitment	No salvage logging will take place in hydrologic Riparian Reserves. Where hazard trees are felled in hydrologic Riparian Reserves for safety, they will be left for large woody debris recruitment. Watershed project design features that address this concern.
27. Delay salving to allow post-burn ecological values to persist	Ecological values of natural recovery of forests will occur on more than 85% of the project area. Delaying salvage treatments will reduce the economic value of the project, producing less revenue for fuels treatments, and will not meet at least one part of the purpose and need for the project.
28. Salvage only areas with 90% or greater mortality	Areas considered for salvage treatment have 50% of more mortality within stands. Trees that will be cut have at least a 70% likelihood of dying. Most of the acres in which salvage logging will take place have 80% to 90% mortality.
29. Don't salvage where fires were ignited from the bottom or suppression	Mapping has been completed for areas where fires were ignited by suppression forces. These maps will be compared with salvage treatment units.
30. In Riparian Reserves, fall trees on the contour to reduce erosion	Contour felling is addressed in watershed project design features.
31. Retain all tress 30 inches in diameter at breast height – living or dead	Project design features address the retention of trees greater than 40 inches in diameter at breast height for legacy components.

The comments on which this alternative is based seek an alternative that includes all of the above recommendations. Comments were considered in developing alternatives considered in detail and, as discussed above, in many areas the revised proposed action (alternative 2) and alternatives include project design features to address these recommendations. The recommendations that are within the scope of the project are met by other alternatives, making an alternative specifically to address these recommendations redundant. Therefore, this alternative will be eliminated from detailed study. However, consultation to address tribal concerns will continue.

Alternative G

This alternative was developed in response to public requests to minimize or eliminate negative effects to watershed conditions from new or reopened roads and landings. Recommendations are listed and addressed in table 2-42.

Table 2-42: Recommendations for no new infrastructure and how each is addressed by alternatives in the Westside Fire Recovery project

Recommendations:	Addressed by:
1. **No construction of new roads, permanent or temporary**	None of the alternatives in the project propose new permanent (system) roads. Alternative 1 proposes no new temporary roads. Action alternatives implement project design features to minimize potential negative impacts of new temporary roads on watershed conditions. Action alternatives differ in the number and location of new temporary roads. In response to relevant issue #1, alternative 4 limits the number and location of temporary roads to further reduce impacts.
2. **No opening of NEPA decommissioned roads**	Alternative 1 proposes no opening of NEPA decommissioned roads. Action alternatives implement watershed project design features to minimize potential negative impacts on watershed conditions of using decommissioned roads as temporary roads. Action alternatives differ in the number and location of decommissioned roads being proposed as temporary roads. In response to relevant issue #1, alternative 4 limits the number and location of temporary roads on decommissioned roads in sensitive watersheds to further reduce impacts.
3. **No opening of self-decommissioned M1 and M2 level roads**	Alternative 1 proposes no opening of “self-decommissioned” roads (roads where trees have grown into the roadway). Action alternatives implement watershed project design features to minimize potential negative impacts of opening “self-decommissioned” roads on watershed conditions. Action alternatives differ in the number and location of self-decommissioned roads proposed for opening and use. In response to relevant issue #1, alternative 4 limits the number and location of self-decommissioned roads that are proposed for use to further reduce impacts.
4. **No construction of new landings**	Alternative 1 proposes no new landings. Action alternatives implement watershed project design features conditions to minimize potential negative impacts of new landings on watershed. Action alternatives differ in the number and location of new landings proposed. In response to relevant issue #1, alternative 4 limits the number and location of new landings to further reduce impacts.
5. **Use of existing landings only if no earthwork is required**	Alternative 1 proposes no use of existing landings. Action alternatives implement watershed project design features conditions to minimize potential negative impacts of using existing landings on watershed. Action alternatives differ in the number and location of existing landings proposed for use.

An alternative that addresses all of these recommendations will not meet all of the project’s purpose and need. Refinements to the proposed action (alternative 2) and the development of alternative 4 to minimize negative effects of new infrastructure to watersheds address the intent of this alternative while meeting the purpose and need of the project. Therefore, this alternative is eliminated from detailed study.

Alternative H

This alternative was developed in response to a number of comments recommending increased treatments within the project area to address the high number of fire-killed trees present on the landscape. Recommendations are listed and addressed in table 2-43.

Table 2-43: Recommendations for increased salvage opportunities and how each is addressed by alternatives in the Westside Fire Recovery project

Recommendations:	Addressed By:
1. Salvage logging of all fire-killed trees in the project area	All fire-killed trees were considered for salvage logging before the proposed action as scoped was developed. Based on economic and logistic feasibility, and the need to meet Forest Plan standards, a smaller number of units were proposed for treatment in the proposed action as scoped. Based on scoping comments, the interdisciplinary team looked at all opportunities to expand the number of acres that can be salvage logged. In order to meet all laws, regulations, and policy, as well as meeting standards in the Forest Plan, salvage on most of these opportunity areas is not feasible.

Recommendations:	Addressed By:
2. Fuels treatments of all salvage-created slash	For action alternatives (2 through 5), treating activity slash, including slash created by salvage, is discussed earlier in chapter 2. Treatments proposed for salvage-created slash include those described in project design features.
3. Extension of operating periods	Most operating periods are limited by the need to be consistent with laws, regulation, policy, and Forest Plan standards as displayed in project design features. In circumstances noted in the project design features, these limits can be modified.
4. No restrictions on size limit for roadside hazard trees	Criteria for roadside hazard trees are discussed earlier in chapter 2. Size limitations are based on fuels to be removed.
5. Planting in all salvage areas	Alternative 1 will not propose any planting. Action alternatives 2 through 5 include planting in all salvage areas.

Although this alternative will meet parts of the purpose and need of the project, following some of the recommendations will not meet current law, regulation, policy and the related Forest Plan standards. The proposed action has been refined as alternative 2 to meet this direction. Therefore, developing an alternative around all of these recommendations would be redundant and this alternative is eliminated from detailed study.

Alternative I

This alternative was developed in response to a concern that the cumulative effects from private and Forest Service salvage treatments will affect habitat connectivity if salvage logging occurs in the Beaver Fire area. This recommendation is listed and addressed in table 2-44.

Table 2-44: Recommendations to remove the Beaver Fire from the project and how this is addressed by alternatives in the Westside Fire Recovery project

Recommendations:	Addressed By:
Remove the Beaver Fire area from the project because cumulative effects from private and Forest Service salvage will affect habitat connectivity	Chapter 3 discloses the cumulative effects of salvage proposed in action alternatives added to the effects of salvage on private lands within the spatial and temporal bounds of the analysis area for each resource including habitat connectivity. See specifically the Terrestrial Wildlife section of chapter 3.

An alternative that addresses this recommendation will not meet all of the project’s purpose and need. Refinements to the proposed action (alternative 2), including implementation of wildlife project design features to minimize negative impacts, and the development of alternative 3 to further address habitat connectivity in the Beaver Fire area. Alternative 3 addresses the intent of alternative I while meeting the purpose and need of the project. Therefore, considering alternative I in detail is redundant and the alternative is eliminated from detailed study.

Alternative J

This alternative was developed in response to concerns about the effects of salvage harvest on many resources and the overall efficacy of this treatment. This alternative is also reflective of many of the public concerns regarding fire safety and the need for reduction of fuels. All salvage harvest units throughout the project area would be eliminated and all hazardous fuels and roadside hazard treatments would be included as described in the refined proposed action. This recommendation is listed and addressed in table 2-45.

Table 2-45: Recommendations for a no-salvage, safety-focused alternative and how this is addressed by alternatives in the Westside Fire Recovery project

Recommendations:	Addressed By:
No Salvage—Fire Safety-focused alternative (eliminate salvage but include all hazardous fuels and roadside hazard treatments	Alternative 1 proposes no salvage within the project area. The effects of this alternative on achieving the purpose and need for the project are disclosed in chapter 3. The effects of implementing hazardous fuels and roadside hazard treatments are displayed primarily on one of the three elements of the purpose and need (safety). Action alternatives 2 through 5 include different levels of salvage and the effects of these treatments on safety are disclosed in chapter 3.

This alternative will meet one part of the purpose and need for this project (to reduce safety hazards to adjacent landowners, the public and forest workers) by including hazardous fuels and roadside hazard treatments. However, it does not meet another part of the purpose and need of the project which is to obtain the maximum economic commodity and value from burned timber. It also will not meet the need to increase the likelihood and speed by which burned forested areas are restored. Refinements to the proposed action (alternative 2), including refined project design features, and the development of alternative 5 to limit salvage harvest to matrix lands while retaining fuels and roadside hazard treatments, address part of the intent of alternative J while meeting the purpose and need of the project. Therefore, alternative J is redundant and eliminated from detailed study.

Chapter 3 Affected Environment and Environmental Consequences

This section summarizes the biological, physical, and socioeconomic environments that may be affected by the project and the potential changes to those environments due to implementation of the alternatives. It also presents the scientific and analytical basis for comparison of alternatives presented in section 2.6.

This chapter is organized by resource area. Following each resource description is a summary of the potential effects (environmental consequences) to the resource associated with the implementation of each alternative. Direct, indirect, and cumulative effects are disclosed. Unless otherwise stated, the effects of alternatives are the same. Effects are quantified where possible; qualitative discussions are included where quantification is not possible. Consequences relative to significance determinations are disclosed.

This draft EIS incorporates the Forest Plan by reference and tiers to the final EIS on which the Forest Plan is based. The discussions of resources and potential effects use existing information included in the Forest Plan and other sources as indicated. Where applicable, such information is briefly summarized and referenced to minimize duplication. The planning record includes all project-specific information such as resource reports, ecosystem analyses, and other results of field investigations. The supporting resource specialist reports are available on the project website http://www.fs.fed.us/nepa/nepa_project_exp.php?project=45579.

Analyzing Environmental Consequences

Environmental consequences are the effects of implementing an alternative on the biological, physical, economic, and social environment. The Council on Environmental Quality regulations implementing the National Environmental Policy Act (NEPA) includes a number of specific categories to use for the analysis of environmental consequences. Several form the basis of much of the analysis that follows. They are explained briefly here.

Direct, Indirect, and Cumulative Effects

Direct environmental effects are those occurring at the same time and place as the initial cause or action. Indirect effects are those that occur later in time or are spatially removed from the activity, but will occur in the foreseeable future. The project is expected to be active over about one to five years from the time the decision is made to full implementation. Cumulative effects result when the incremental effects of actions are added to other past, present, and reasonably foreseeable future actions, regardless of what agency or person undertakes such actions. Cumulative effects can result from individually minor, but collectively significant, actions taking place over a period of time. Past activities contributed to the existing condition and are considered in the affected environment. Present and reasonably foreseeable future actions are assessed along with the effects of the proposed action to determine whether significant cumulative effects may occur. This analysis is consistent with the Council on Environmental Quality memo from James L. Connaughton titled "Guidance on the Consideration of Past Actions in Cumulative Effects Analysis" dated June 24, 2005, incorporated by reference.

In order to understand the contribution of past actions to the cumulative effects of the proposed action and alternatives, this analysis relies on current environmental conditions as a proxy for the impacts of past actions. This is because existing conditions reflect the aggregate impact of all prior human actions and natural events that have affected the environment and might contribute to cumulative effects.

This cumulative effects analysis does not attempt to quantify the effects of past human actions by adding up all prior actions on an action-by-action basis. There are several reasons for not taking this approach. First, a catalog and analysis of all past actions would be impractical to compile and unduly costly to obtain. Current conditions have been impacted by innumerable actions over the last century (and beyond), and trying to isolate the individual actions that continue to have residual impacts would be nearly impossible. Second, providing the details of past actions on an individual basis would not be useful to predict the cumulative effects of the proposed action or alternatives. In fact, focusing on individual actions would be less accurate than looking at existing conditions, because there is limited information on the environmental impacts of individual past actions, and one cannot reasonably identify each and every action over the last century that has contributed to current conditions.

Additionally, the important residual effects of past natural events may contribute to cumulative effects just as much as human actions. By looking at current conditions, we are sure to capture all the residual effects of past human actions and natural events, regardless of which particular action or event contributed those effects. Third, public scoping for this project did not identify any public interest or need for detailed information on individual past actions. Finally, the Council on Environmental Quality interpretive memorandum cited above states, "agencies can conduct an adequate cumulative effects analysis by focusing on the current aggregate effects of past actions without delving into the historical details of individual past actions." The cumulative effects analysis in this EIS is also consistent with Forest Service Regulations for implementing NEPA (36 CFR 220.4(f)).

The Forest Schedule of Proposed Actions was reviewed to identify which current and reasonably foreseeable future actions on the Forest may be considered for cumulative effects analysis. Appendix C provides a list of these actions. A search of proposed timber harvest plans for future actions on private land with potential cumulative effects are noted in appendix C.

Analysis areas vary by resource, so some ongoing or future actions are included in the cumulative effects analysis of some resources and not of others. Cumulative effects may include estimated effects from present logging (timber harvest, fuels treatments, road and landing construction and maintenance) and wildfire activities (e.g. suppression activities and the affected burn areas). Other actions may include but are not limited to fuels reduction and/or forest health projects in the vicinity.

Vegetation

The purpose of this section is to assess the fire impacts to the vegetation on the landscape and determine what effects actions will have on increasing the likelihood and speed by which burned forested areas are regenerated as well as the consequences of not taking any action to accelerate the establishment of conifers on the landscape. Discussion of various scientific literature is incorporated to support the evaluation of effects from the stands to be treated with either salvage harvest, site preparation and planting, or some combination of each.

Methodology

Site visits to the project area by foresters and a silviculturist were conducted between October 2014 and December 2014. Remotely sensed data on vegetation burn severity were field-validated and potential treatment areas were identified. Stand data were collected using ocular estimates and plot data collection, as needed.

Observations included the following:

- Pre-fire stand condition of vegetation (growth, species composition);
- Post-fire stand condition of vegetation;
- Availability of natural seed sources on site and within natural seed distribution distance;
- Availability of suitable snags for retention;
- Availability and suitability of hardwoods for retention;
- Plantability (reasonable ability to plant conifers in an area), an estimate of physical effort needed to conduct artificial regeneration;
- Regeneration potential, an estimate of the potential for artificial regeneration; and
- Site class, aspect, and elevation estimates as they relate to artificial regeneration attributes and regeneration potential.

Stand data were compiled from existing plots in the project area and used to simulate future stand conditions based on proposed treatments. The Forest Vegetation Simulator was used to estimate time needed to establish conifer-dominated stands. Northern spotted owl dispersal habitat characteristics were used as a threshold for considering a stand to be on a trajectory towards late-successional characteristics (diameter at breast height of 11.0 inches, canopy cover 40 percent, percentage of conifer composition). In addition to using professional judgment and visual cues during site visits, the 1944 Wieslander vegetation mapping was used to assess historic species composition and conifer dominance throughout the project area (Kelly et al. 2005). Proposed units for planting were substantiated using this background information.

Analysis Indicators

- Acres treated (site prepared and planted) to promote conifer regeneration;
- Percent of landscape treated to restore a mature stand of conifers within 60 years with and without future fire disturbance; and
- Vegetation type regenerated in the short-term, and in the long-term.

Spatial and Temporal Context

Spatial bounding is limited to units within the project area considered for regeneration treatments (including salvage units, existing plantations, and select natural stands not included in salvage) and hazard tree removal along roads (areas where regeneration is likely to be affected by the project). The spatial area surrounding roads on which hazards trees may be removed averages an estimated 24 acres per road mile.

Both short-term and long-term effects will be considered in this analysis. Short-term temporal bounding is the time period in which treatments occur from harvest activity, site preparation, and planting; this is about one to five years because effects on regeneration will begin to be visible during this time period. Long-term temporal bounding is for an estimated 40-100 years from project implementation and is based on the maximum time for reduction of surface woody fuels following fire (Peterson, Dodson and Harrod 2014) and computer-generated modeling that showed stand conditions approaching the desired late-successional characteristics.

Affected Environment

Before the fires of 2014, vegetation types within the project area generally ranged from an oak/brush/grass type to well-stocked mixed conifers. Age classes ranged from 20 year-old plantations to late-successional forest. Using the existing vegetation layer provided from the CALVEG dataset, the size classes described in Table S-1 were distributed throughout the project area. California Wildlife Habitat Relationships (CWHR) type is derived primarily from CALVEG type and relative cover of conifer and hardwood trees for various mixed conditions. It represents an estimate of the variation in stand conditions that existed before the fires. Table 3-1 displays the percentage of the project area that was classified by a specific size class prior to the fires as well as the percentage of each size class included within salvage units. Salvage treatments are only proposed for areas of moderate to high severity vegetation mortality (i.e. greater than 50 percent of trees fire-killed on a unit level, based on Rapid Assessment of Vegetation Condition after Wildfire (RAVG)). Using the field-verified RAVG data, treatments are proposed on 28 percent of the area within the 185,000-acre burn that resulted in greater than 50 percent mortality (64,000 acres burned with more than 50 percent mortality).

Table 3-1: Percentage of size classes within the project area

CWHR Code	CWHR Size Class	Diameter at breast height	Percentage of diameter class within Project Area	Percentage that burned with greater than 50 percent mortality	Percentage that burned with greater than 50 percent mortality within proposed treatment units
1	Seedling tree	<1.0"	1 percent	<1	
2	Sapling tree	1.0" - 5.9"	6 percent	2	
3	Pole tree	6.0" - 10.9"	16 percent	4	1
4	Small tree	11.0" - 23.9"	41 percent	11	3
5	Medium/large tree	≥24.0"	25 percent	6	2

CWHR Code	CWHR Size Class	Diameter at breast height	Percentage of diameter class within Project Area	Percentage that burned with greater than 50 percent mortality	Percentage that burned with greater than 50 percent mortality within proposed treatment units
6	Multi-layered tree	A distinct layer of size class 5 trees over a distinct layer of size class 4 and/or 3 trees, and total tree canopy of the layers ≥60 percent (layers must have ≥10.0 percent canopy cover and distinctive height separation).	0 percent		N/A
0	Not Determined / Not Applicable		<1 percent		1 percent

The oak/brush/grass type is typically found on low-elevation sites on shallow, rocky soils located on southerly and westerly aspects which exhibit harsher conditions than on northerly and easterly aspects. As elevation increases, conifer species become more prevalent, primarily as a function of favorable environmental conditions for conifer survival and growth. Deeper, more developed soils than those at low elevations supported mixed conifer stands of Douglas-fir, ponderosa pine, incense cedar, and sugar pine. Higher elevation sites within the project area lend themselves to favorable conditions for red fir and white fir survival and growth, with white fir becoming a substantial component of the mixed conifer type. Hardwood species, including Pacific madrone, California black oak, canyon live oak, Oregon white oak, tanoak, and bigleaf maple are generally a minor component of mixed conifer stand composition.

The project is focused on areas that burned with moderate and high vegetation severity. High severity areas are characterized by total or near-total conifer crown consumption. Individual trees in this condition were either killed or damaged beyond their ability to survive. Within areas of moderate burn intensity, some crown consumption has occurred as a result of the fire but these areas are characterized by total or near-total crown scorch. The vast majority of crown-scorched trees have been killed by the fire or damaged beyond their ability to survive. Within areas of light vegetative burn severity, the impacts on conifers were often severe, especially to the smaller size and lower crown classes. Within the fire-burned area, approximately 70 percent of all the existing plantations survived the extreme fire conditions of the 2014 Fires.

Understory vegetation has been totally consumed or top-killed throughout much of the project area; the degree of mortality is primarily a function of fire intensity. On areas burned at moderate to high intensity levels, mortality is essentially complete. On areas burned at low-intensity levels, if the fire was hot enough to consume the organic layer then understory vegetation, including conifer seedlings and saplings, were also killed.

Light-seeded, prolific, early successional weed and grass species, having survived the fire in unburned pockets and perimeter areas, will rapidly reinvade burned areas. Well-established perennial root or rhizome species will likely re-sprout from existing root systems. Brush species, such as manzanita, snowbrush, deerbrush and whitethorn, are well-adapted ecologically to the fire-impacted ecosystems. Assuming fire intensity and duration at less than lethal levels, these species are capable of root collar sprouting. Brush seed, which may retain viability for 40-150 years in the duff layer, will germinate in potentially large numbers for 2-3 years after fire-scarification. Fire top-killed hardwood tree species, such as black oak, tanoak, madrone, and live oak are also capable of root-collar sprouting. These species are able to take immediate advantage of a well-established root system, giving them the inherent capability to grow rapidly for early site dominance.

There is an estimated 150,000 to 300,000 hundred cubic feet (ccf) (75 to 150 million board feet) of burned timber that may be removed. The removal of these dead trees will help ensure effective and timely restoration of burned treatment stands. Fire killed trees retain market value for approximately two years after the fire; smaller trees and smaller logs (less than 14 inches in diameter) lose value much more quickly than larger trees and logs (Lowell, Willits, and Krahmer 1992). The site is well roaded, making commercial removal of merchantable trees feasible. Without using the receipts from the sale and removal of dead trees, site recovery may be cost prohibitive. Planting without fuels reduction and site preparation would likely result in the loss of conifer plantations before they mature, given the median 8- to38-year fire return interval of the Klamath Province (Skinner, Taylor, and Agee 2006).

Environmental Consequences

Alternative 1

Direct and Indirect Effects

Under alternative 1, the entire burned area will be left to recover naturally. Severely burned trees that survived the 2014 fire will continue to die for several years due to injuries to crowns and cambium tissue from the fire, drought stress, and post-fire insect attack of weakened trees. Natural regeneration of coniferous forest may occur in severely burned patches, but it will be highly variable. Larger burn patches will regenerate more slowly because of distances from seed sources.

Successful natural regeneration in one to two decades, though highly variable, has been documented following stand-replacing fires in the Klamath Province within white fir, Douglas-fir, and Douglas-fir/tanoak stand types (Shatford, Hibbs and Puettman 2007; Joint Fire Science Program Final Report, Project 05-2-1-40 2009). Pine and mixed-conifer associations were not sampled in the Shatford et al. study. More typically, vegetation is likely to go through an extensive time-period of hardwood- and brush-dominated site occupancy (Zhang, Webster, Powers and Mills 2008). Reforestation will slowly occur naturally but may take many decades to replace brushfields (Zhang et al. 2008). In larger patches where the majority of the trees were killed by the fire, re-establishment of forest cover would rely on natural regeneration and may take decades or longer. For the larger, contiguous areas of high-severity burn, distance from seed sources may further delay natural regeneration. In some cases of high-severity burn, there are no living conifer trees available to provide potential seed for potential natural regeneration for several miles.

Overstory and understory vegetation which was killed but not consumed by the fire will remain, and over time contribute to higher fuel loadings (Peterson et al. 2014). Given the high residual fuel loading, probable length of time required for site dominance by conifers and the fire history, it is likely the area will re-burn before fire-resilient trees can become established.

Suitable lands for conifer regeneration will be re-occupied, generally by brush and hardwood species. Without salvage, site preparation and planting, severely burned stands will likely be replaced by shrubs and brush (Skinner, Taylor and Agee 2006); regeneration of conifers and restoration of forested wildlife habitat may take decades.

Lands unsuitable for conifer growth will re-vegetate through natural successional processes. Grasses, forbs, brush, and hardwoods will continue to dominate these sites for many years. Without reforestation efforts, these areas will re-vegetate primarily as areas of grass, shrubs and some hardwoods, resulting in a loss of the conifer forest habitat that previously existed, for an indefinite period of time. Conifers will generally consist of scattered individual or small groups of ponderosa pine, sugar pine, knobcone pine, Douglas-fir, incense cedar, and white fir.

Although natural regeneration of conifer species has occurred elsewhere, following more typical wildfire site conditions, the project area has a higher percentage of acres burned at high intensities than more typical historic patterns, resulting in prolonged regeneration periods and variable stocking patterns on unplanted sites (Shatford et al. 2007). Assuming large, stand-replacing fires will continue to occur, long-lasting early-seral plant communities will increase within the project area primarily because more area is burned at higher intensities than historic patterns predict (Skinner et al. 2006). Although post-fire observations may indicate surprisingly prolific regeneration, even on severely burned sites, natural regeneration establishment in local wildfires in the past led to desired stocking levels typically only being met around the edges of the fire where a good seed source is still intact (Bonnett, Schoettle, and Shepperd 2005). The remaining standing dead trees would be a hazard to new plantations, forest visitors, and forest workers as dead trees fall or create increased fuel on the ground.

The likelihood and time required for conifer regeneration is affected by bark beetle infestations. Alternative 1 has a sizeable risk of bark beetle population increases, primarily because all stressed trees remain. This results in the maximum potential habitat source for beetles, and the maximum potential loss of living trees as the insect population moves into lightly burned areas and adjacent green stands. Lesser levels of mortality are anticipated in stands outside the fire-affected area than in the project area but some increase in beetle infestation is expected among live trees. Experience from previous wildfires indicates that an outbreak can be intense for the one to two years post-fire.

Cumulative Effects

Adding the effects of alternative 1 to those of current and reasonable foreseeable future actions listed in appendix C will provide no measurable cumulative effects to the extent and time required for conifer regeneration.

Alternative 2

Direct and Indirect Effects

Salvage Harvest and Reforestation

Salvage harvest, most of which will have subsequent site preparation and planting, will occur on an estimated 6,800 acres or about four percent of the National Forest System land within the project area. Proposed acres of salvage and planting are in areas that primarily burned with high severity effects on vegetation. High severity burn areas have very few seed-cone capable trees remaining to provide natural seedling capability. Without salvage and planting, these areas will likely not regenerate satisfactorily for many decades. The techniques used for salvage harvest, site preparation and planting, and the number of acres proposed for each technique, are displayed in chapter 2. For the purposes of this analysis, trees within salvage units that have a 70 percent or greater probability of mortality from fire damage are considered fire-killed and may be harvested; trees that have greater than 30 percent probability of surviving are considered green and will be retained unless they pose an eminent threat to safety or must be removed for safe and efficient logging operations. Salvage harvest unit boundaries may include riparian reserves and patches of green trees that burned with lower severity but these areas will not be harvested. Acres salvage-harvested and site-prepared will be planted with a variety of coniferous species to ensure diversity, and will be released from competing vegetation within a year or so of being planted. Salvage harvest, followed by site preparation, planting, and release gives the highest likelihood of successful conifer regeneration. Twenty-eight percent of the landscape that burned at moderate to high severity will be treated to achieve mature conifer stands.

If fuels are treated effectively, and the area is planted, the amount of time needed to restore the site to a sustainable coniferous forest may be reduced. Removing large trees by salvage alone is not sufficient fuel treatment. Research has shown that plantations established in areas with high slash loadings burned severely, while those where residual slash had been adequately treated burned with much less intensity or not at all (Thompson, Spies and Ganio 2007; Weatherspoon and Skinner 1995). Therefore, effective fuel treatment is an essential component of sustainable reforestation in the Klamath Province (Peterson et al. 2014). Research has shown that the quickest way to reestablish a coniferous forest after stand replacement fire is by active reforestation (Rose and Haase 2005). Aggressive reduction of residual fuels will be necessary to prevent future fire events from becoming stand-replacing fires that destroy planted seedlings. Research has shown fuel treatments increase the likelihood of the planted trees surviving future fires (Weatherspoon and Skinner 1995, Omi and Kalabokidis 1991). Heavy residual fuels need to be reduced substantially to help assure sustainability of plantations. Follow-up reforestation surveys will be completed to assure that the reforestation objectives are achieved.

Since most of the fire-burned areas will be allowed to regenerate naturally (only four percent will be salvage harvested and another five percent will be site prepared and planted outside salvage units), many acres of lands suitable for conifer growth will continue to be understocked or non-stocked by conifers, possibly for decades. These suitable lands will generally be re-occupied by brush and hardwood species. Substantial snag stocking will remain on these reforested lands. Low-impact site preparation methods, which create fewer suitable planting spots, combined with losses inflicted by falling snags, and limited access, result in generally poor chances for conifer re-establishment on these sites.

Lands unsuitable for conifer growth will also re-vegetate through natural successional processes. Grasses, forbs, brush, and hardwoods will continue to dominate vegetation on these sites.

Natural Stand Areas Reforestation and Conifer Plantation Reforestation outside Salvage Units

In addition to salvage harvest acres site-prepared and planted, selected natural stands and conifer plantations that became non-stocked or understocked as a result of the 2014 fires will be site-prepared and planted with implementation of alternative 2. Natural stand and conifer plantation site preparation and planting will occur on an estimated 7,900 acres (five percent of National Forest System lands in the project area). Proposed acres of site preparation and planting are primarily in high severity burn areas that have very few seed-cone capable trees remaining to provide natural seedling capability. Thus, without site preparation and planting, these areas will likely not regenerate conifers satisfactorily for many decades. Techniques and acres assigned to each technique are displayed in chapter 2.

Roadside Hazard Tree Removal

Hazard tree removal is not a silvicultural treatment to promote conifer regeneration. Hazard tree felling, and where appropriate, removal, is proposed to address public and administrative safety concerns due to the risk of trees falling onto roads. Where hazard tree removal overlaps with proposed salvage harvest units, the effects are the same as salvage effects. Hazard tree removal where it does not overlap with proposed salvage harvest units will decrease fuel loading and, therefore, potential fuels hazard; this will indirectly promote conifer regeneration. Where seed sources are adjacent to roadside hazard removal areas, it is likely that natural regeneration will occur.

Cumulative Effects

The projects added to the effects of the past actions (the affected environment) and the direct and indirect effects of the proposed project are portions of the Elk Thin project (underburning), the Happy Camp Fire Protection project, Phase 2 (roadside buffer) and the Thom-Seider Vegetation Management and Fuel Reduction project (various treatments). When combined with the direct and indirect effects of the proposed salvage, site preparation, and planting treatments, the end result would be an increase in acres treated for hazardous fuels reduction, an increase in acres of roadside treatments and an increase in acres of planted conifer stands set on a trajectory towards establishing resilience to fire, insects, and disease and towards achieving northern spotted owl dispersal, foraging and nesting/roosting habitat characteristics. The objectives of the proposed project are in concert with those proposed by these overlapping projects which may no longer be implemented within the project area due to changes in conditions. However, given the desired condition of resilience and fuels reduction, the proposed treatments will beneficially increase the magnitude of the effects of these fuels reduction activities.

Alternative 3

Direct and Indirect Effects

Effects of alternative 3 will be the same as for alternative 2 for areas in which salvage harvest is implemented (5,800 acres, about four percent of the National Forest System lands within the project area). Twenty-six percent of the landscape that burned at moderate to high severity will be treated to achieve mature conifer stands. Effects of site preparation and planting outside of salvage units are the same as for alternative 2. Effects of areas that are not salvage-harvested will be the same as those in alternative 1.

Cumulative Effects

Cumulative effects for alternative 3 are the same as for alternative 2 for areas in which salvage harvest is implemented. Effects of site preparation and planting outside of salvage units are the same as for alternative 2. Effects of areas that are not salvage-harvested are the same as those in alternative 1.

Alternative 4

Direct and Indirect Effects

Effects of alternative 4 will be the same as for alternative 2 for areas in which salvage harvest is implemented (5,900 acres, about four percent of the National Forest System lands within the project area). Twenty-six percent of the landscape that burned at moderate to high severity will be treated to achieve mature conifer stands. Effects of site preparation and planting outside of salvage units are the same as for alternative 2. Effects of areas that are not salvage harvested will be the same as those in alternative 1.

Cumulative Effects

Cumulative effects for alternative 4 are the same as for alternative 2 for areas in which salvage harvest is implemented. Effects of site preparation and planting outside of salvage units are the same as for alternative 2. Effects of areas that are not salvage-harvested are the same as those in alternative 1.

Alternative 5

Direct and Indirect Effects

Effects of alternative 5 will be the same as for alternative 2 for areas in which salvage harvest is implemented (1,900 acres, one percent of the National Forest System lands within the project area). Effects of site preparation and planting outside of salvage units are the same as for alternative 2 except site preparation and planting will occur on only 3,860 acres of matrix lands (two percent of the National Forest System lands within the project area). Fourteen percent of the landscape that burned at moderate to high severity will be treated to achieve mature conifer stands. Effects of areas that are not salvage harvested will be the same as those in alternative 1.

Cumulative Effects

Cumulative effects for alternative 5 are the same as for alternative 2 for areas in which salvage harvest is implemented except on fewer acres. Effects of site preparation and planting outside of salvage units are the same as for alternative 2 except on fewer acres. Effects of areas that are not salvage harvested are the same as those in alternative 1.

Comparison of Effects

Alternatives 1 and 5 will, in time, result in reestablishment of a coniferous forest (Zhang et al. 2008; Shatford et al. 2007); however, that forest may not be sustainable in terms of fuels and fire history because residual fuels will not have been treated or will only have been treated in part. It may also take decades to reach that stage (Zhang et al. 2008).Given the fire return interval of the Klamath Province and the fuels present on the site, a stand replacement re-burn is likely simply because it takes so long for a coniferous forest to reestablish itself. Without fuels reduction and active reforestation in these conditions, re-burns where fuels are heavy tend to be stand replacement events (Skinner et al. 2006; Weatherspoon and Skinner 1995). The result will likely be a loss of forest cover in this area and a conversion to brush/hardwoods.

Analysis indicators for each alternative are compared in table 3-2.

Table 3-2: Comparison of analysis indicators for each alternative

Treatments	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Acres treated (site prepared and planted) to promote conifer regeneration	0	14,700	13,700	13,800	5,700
Percent of moderate to high severity burned landscape restored to a mature stand within 60 years	0	28 percent	26 percent	26 percent	14 percent
Type of vegetation likely to regenerate in: *Short-term*	Grass, forbs, brush	Brush, hardwoods, young conifers	Brush, hardwoods, young conifers	Brush, hardwoods, young conifers	Brush, hardwoods, some young conifers within matrix lands
Type of vegetation likely to regenerate in: *Long-term*	Brush, hardwoods, isolated patches of conifers	Mature, mixed conifer stands	Mature, mixed conifer stands	Mature, mixed conifer stands	Brush, hardwoods, mature mixed conifer within matrix lands; isolated conifers in late successional reserves

Compliance with law, regulation, policy, and the Forest Plan

All alternatives are in compliance with law, regulation, policy and the Forest Plan in relation to vegetation as displayed in the Forest Plan consistency checklist. Silvicultural prescriptions under action alternatives comply with the Forest Plan. Salvage, site preparation and planting are all methods for establishing desired conifer stocking with some level of fire resilience once seedlings are established.

Fire and Fuels

This section provides a synopsis of the effects of the project on fire behavior potential and resistance to control of future wildland fire activity across the project area.

Methodology

Overview of Methodology

The fire and fuels report takes into consideration the three elements that affect fire behavior: fuels, weather, and topography. The interactions of these elements present potential issues to vegetation and fire suppression capabilities. Although all of the elements are important, the project realistically can only affect the fuels element. A combination of field-collected data, geospatial data, fire modeling, professional judgment, and literature review was used to provide a landscape level picture of potential fire behavior and analyze environmental consequences of the project to fire and fuels.

Using Behave Plus and FlamMap fire behavior modeling programs, fire behavior outputs were generated to compare alternatives over time. Post-fire stand data were collected in areas that burned with high, moderate and low severity effects. The collected data were entered into the Fire Management Analyst (FMAPlus 3) model to quantify canopy and tree bole biomass loading. These data were used to enter into a snag-fall and decay model that quantifies potential surface fuel loads overtime as snags weaken, break and/or fall over. Selected stands were also evaluated using the Forest Vegetation Simulator along with the Fire and Fuels Extension of Forest Vegetation Simulator to project future surface fuel loads over time. More detailed information and modeling assumptions for each program are provided in the fire and fuels resource report, available on the project website.

Literature and case studies were reviewed to examine similar landscapes with regard to fire behavior, severity, and resistance to control. Conflicting scientific knowledge on the effects of post-fire fuels treatments is discussed in the resource report.

Analysis Indicators

Analysis indicators used to evaluate effects of the project include potential fire hazard and resistance to control; these are measured by flame length, fireline intensity, rate of spread, and surface fuel loading.

Fire hazard is defined as “a fuel complex, defined by volume, type condition, arrangement, and location, that determines the degree of ease of ignition and of resistance to control”(National Wildland Coordination Group, 2014).

Measurement indicators to assess fire hazard include flame length, fireline intensity, and rate of spread as fire modeling predicts fire behavior based on surface fuels less than three inches in diameter). Fuels larger than 3” in diameter are not used in fire modeling programs to display potential fire behavior outputs but are important indicators of resistance to control.

Flame lengths are a visual indicator of fireline intensity; as flame lengths increase, fireline intensity increases (see the body of the fire and fuels resource report).

Byram (1959) defined fireline intensity as the rate of heat energy release per unit time per unit length of fire front, regardless of the depth or width of the zone of active flaming combustion. With respect to fire suppression, fireline intensity is how hot the fire is burning and how close resources can be to the fire; fireline intensity is used to forecast whether to use direct or indirect firefighting tactics.

Resistance-to-control is generally viewed as an estimate of the suppression force required for controlling a unit of fire perimeter. For example, “high” resistance to control means “slow work for dozers, very difficult for hand crews; hand line will be difficult”(Brown, Reinhardt, & Kramer, 2003)..

Surface fuel loading by fuel size category is evaluated as a measure of resistance to control. To quantify potential intensity of large fuels (greater than three inches in diameter) Byram’s (1959) fireline intensity equation and surface fuel loadings (tons/acre) of zero to three inch and three to ten inch diameter material is used to measure resistance to control related to fireline production capabilities of fire suppression resources (see the body of the fire and fuels resource report).

Spatial and Temporal Context

This analysis is limited to the spatial extent of the project area because effects on fire and fuels can be accurately estimated within this area.

Short-term analysis is considered at one to five years post-fire; long-term analysis extends out to greater than 20 years to model the potential effects of standing snags, downed wood and subsequent surface fuel loading over time.

Affected Environment

Few forested regions have historically experienced fires as frequently and with such high variability in fire severity as the Klamath Mountains Bioregion(Taylor & Skinner, 1998) which includes the project area. Within the project area, lightning has accounted for 74 percent of ignitions and 82 percent of burned acres in the project area. Median fire return interval ranged from eight to 38 years (Taylor, Skinner, & Agee, 2006). A great portion of the landscape remained unburned between 20 to 100 years prior to the 2014 fires.

Approximately 26 percent of the area burned by the 2014 fires experienced high severity fire effects. High severity fire areas experienced crown fire activity resulting in full consumption of ground, surface and aerial canopy fuels. High severity crown fires result in high levels of tree mortality, consuming leaves and small branches but leaving the boles largely intact (Ritchie, Knapp, & Skinner, 2012). At the ground and surface fuel level, duff and needle cast, small branches and large downed woody material were fully consumed; in the canopy full consumption of leaf and needle foliage occurred leaving standing dead trees and barren soils (see the body of the fire and fuels resource report). Overall, the impact led to high levels of tree mortality.

Low to moderate severity fire areas experienced a mix of mortality. Generally surface fuels within the understory were fully consumed along with burning smaller trees and understory vegetation. Where heavy concentrations of fuels burned under the overstory canopy, needles were scorched, turned brown and remain within the overstory fuel complex. Overtime, needle cast, and small branch wood will fall to the forest floor accumulating sufficient fuel loadings to support the ignition and spread of fire.

The high density of fire-killed trees within the project area presents a unique hazard to firefighters and promotes future problem fire behavior as these trees are both ember producers and receptors to fire ignition. Over time, fire hazard and resistance-to-control are expected to change as dead trees fall and new vegetation is established across the fire area, contributing to surface fuel loading, fuel structure and arrangement, and subsequent fire behavior.

Environmental Consequences

Alternative 1

Direct Effects and Indirect Effects

No direct effects are anticipated under alternative 1 since no planned activities will occur. In the short term, fire spread and intensity are expected to be restricted due to a lack of surface fuel loads to support fire spread and a lack of heavy fuel accumulations to affect fire intensities.

Indirect effects will occur over the course of a ten to 20 year timeframe as a result of alternative 1. Standing snags may retain a substantial amount of biomass that will contribute to surface fuels over time as snags fall(Ritchie, Knapp, & Skinner, 2012). Areas that supported high and moderate fire severity present future fire hazard within ten years. Dead trees will continue to decay, break and fall, contributing to surface fuel loading and increasing fire hazard (detailed information in the body of the fire and fuels resource report) displayed as projected fuel loads over a 50-year time period. Fuel loading in the tables is separated by size class (less than 3” and greater than 3” in diameter). Material less than three inches in diameter is a main driver of fire ignition and spread, and material greater than three inches influences fire intensity and resistance to control.

Forested vegetation that supports large trees intermixed with shade tolerant small diameter trees presents a high hazard and subsequent high fire severity in the future as smaller fuels accumulate to increase fire ignition and spread. Large fuels contribute to sustained ignition during the flaming front and subsequent duration “burn-down” time as fuels smolder and are consumed, retaining high intensities for longer periods of time.

Low severity fire areas where mortality rates within the understory are low have the least potential for increased surface fuel loading over time due to the lack of snags that accumulate on the surface and lack of shading to reduce shrub growth. Table 3-3 provides a summary of flame length and intensity over a 50-year period and potential change in condition across the landscape with this alternative.

Over the course of a 50-year period, surface fuel accumulation is expected to occur from two sources: (1) new vegetation that establishes and grows over time, and (2) accumulations from snags as they fall. Forested areas are anticipated to re-establish into a non-forested vegetation composition of shrubs and forbs (see Vegetation section) and in turn contribute to fire ignition and spread potential. Over the course of time, it is anticipated that fireline intensities from stored standing material that fall and accumulate on the surface will exceed intensities of 6,000 British Thermal Units per foot per second (btu/ft/sec). Fireline intensities may be greater than 10,000 btu/ft/sec in extreme fire events. As shown in the fire and fuels resource report, these are intensities that promote fire activity conducive to major fire runs, crown fire activity, and spotting. Re-burn within these locations will have a high probability of burning at high severity again due to the fire intensity and duration as larger fuels are consumed after the flaming front has passed.

High fireline intensities and snags promote problem fire behavior and high resistance to control resulting in the need for large quantities and types of resources. Snags promote fire spread via spot fire ignition and, coupled with large down logs, present high resistance to control as fireline production rates (constructed fireline) are slower in areas with high fuel loads. Since lightning is the predominate cause of ignition in the project area, there is a future concern that small fires will be difficult to control and will have a high probability of requiring large quantities of suppression resources. Under alternative 1, control of future large fires will be difficult and time consuming in areas that have high densities of snags and surface fuel loadings. Fire managers naturally gravitate to strategic ridge systems, roads and natural barriers such as rivers and streams to control large fires. Increased time will be required to prepare control lines in areas that have numerous snags and large woody downed material, and longer times will be needed to hold and mop-up control lines to secure the fire perimeter. Under alternative 1, increased exposure to fire suppression resources will be anticipated due to increased line production and mitigating the increased densities of snags.

Table 3-3: Potential fire behavior (by acreage) over the span of 50 years within the Westside Fire Recovery project area

Year	Flame Length				Fireline Intensity			
	< 4 feet	4 to 8 feet	8 to 11 feet	> 11 feet	< 100 btu/ft/sec	100 to 500 btu/ft/sec	500 to 1000 btu/ft/sec	> 1000 btu/ft/sec
1	198,633	6,494	2,298	7,593	192,647	6,140	4,439	11,792
10	80,739	98,039	10,875	25,365	75,407	108,685	17,659	13,267
50	40,906	40,259	24,510	109,343	35,849	74,944	51,839	52,386

Cumulative Effects

Ongoing and foreseeable future actions in the project area are listed in appendix C. Alternative 1 will not supplement other present and/or reasonably foreseeable future projects that are planned to improve forest health, old growth desired conditions, fire resilience, and suppression effectiveness across the landscape. Additionally, difficulties may preclude future projects from either continuing or being planned due to the high density of snags within or adjacent to the Westside Fire Recovery project area. Using fire as a management tool in both the planned (prescribed fire) and unplanned setting may not meet desired resource objectives due to future fuel loading potential as well as the hazard, cost, and time needed to remove decaying hazard trees from planned control lines. This will be a limiting factor in future prescribed fire activities.

Concerns raised during public scoping regarding treating fuels adjacent to private lands, both those owned by timber companies and residential communities, will not be addressed. Fuel reduction activities planned by fire safe councils and other community organizations will occur. However, opportunities to develop fuel breaks on the Forest to connect with those proposed by adjacent land owners will not be recognized in alternative 1.

The majority of the remaining burned area is owned by Fruit Growers Supply Company (FGS) and Michigan California Timber Company, and is located within the Beaver Fire area. Both of these companies are either currently treating or planning to treat their land by conducting salvage operations on their respective properties. It is understood that FGS is planning a series of fuel breaks within the ridge and road systems of the Beaver Fire area; their lands are intermixed with National Forest System land. Salvage operation of all trees is generally occurring on slopes less than 45 percent and commercial trees are being removed on slopes greater than 45 percent. After salvage operations are completed replanting is expected. It is also expected that herbicide treatments will be applied to the planted areas to reduce shrub growth. As a result of the operations expected on privately owned lands these lands are expected to be relatively fire safe. This is primarily due to the removal or reduction of most of the dead and dying trees on these lands.

Alternative 2

Direct Effects and Indirect Effects

Salvage, Site Preparation, Roadside, Hazardous Fuels Treatments

Alternative 2 implements multiple types of activities to reduce snag densities and surface fuel loading. Alternative 2 also increases future fire management actions and fire resiliency. Post-fire logging can serve as an effective tool for managing fuel loadings in forests regenerating after high severity wildfires (Peterson, Dodson, & Harrod, 2014).. The direct effect of salvage harvest is reducing density of snags on the landscape (Ritchie, Knapp, & Skinner, 2012)and subsequently reducing future accumulations of large diameter surface fuels as trees fall to the forest floor.

Approximately 6,800 acres of salvage harvesting is proposed, which will reduce snag densities of trees equal to or greater than 14 inches in diameter at breast height (dbh). This action immediately removes larger diameter fire killed trees off-site while generally leaving un-merchantable tops and branches on the ground. Within these units, planned site preparation activities after salvage harvesting will cut remaining fire killed trees (equal to or less than14 inches diameter at breast height). To accomplish fuel reduction activities, slash remaining onsite will be reduced to a minimum of ten tons/acre (less than 3 inch diameter fuels), and/or structure and composition of the fuel bed altered, and will utilize a combination of methods including, machine and hand piling, broadcast burning and/or mastication.

Harvesting of trees are planned utilizing ground based, cable and helicopter logging. It is anticipated that there will be a delay between harvesting activities and associated fuel reduction activities. During this time frame, greater accumulation of surface fuels due to logging activities would be anticipated especially within cable and helicopter units where whole tree yarding is not planned. The short term effect of logging is an elevated surface fuel loading from broken tops and branch wood. The greatest fuel loadings post-harvest is expected to occur within helicopter units, followed by cable and ground based units. However, post logging activity breaks the structure and composition of the fuel bed. Upon completion of fuel reduction activities, ground based units would be expected to reduce the greatest amounts of surface fuels due to the ease of facilitating piling and other fuels reduction activities on gentler slopes. Steeper slopes (greater than 40 percent) would be anticipated to require hand piling and or broadcast burning to achieve desired surface fuel loadings of less than 10 tons/acre. Compared to ground-based and cable units, within helicopter units or those areas on steep slopes, larger diameter (greater than 3” diameter) fuels may have increased loads as these fuels can be difficult to pile by hand.

Piling and burning activities reduces fuel loading and breaks the continuity of fuel beds. Techniques including lop and scatter, and chipping or mastication alter the fuel bed and structure of fuels. Mastication is essentially the mulching or chipping of wood material. The direct effect of mastication includes changing the structure and composition of the fuel bed post fire. With no project activities implemented, surface fuels will increase over time as trees fall. As these trees fall in random patterns, fuels will essentially “crisscross” and result in some fuels resting on top of others, effectively increasing fuel bed height (see the body of the fire and fuels resource report). Higher surface fuel beds will be subject to wind and preheating of fuels lower in the surface fuel profile; thus, increasing potential fire behavior. Rather than having standing dead material that falls over time, chipped material will create a compact fuel bed in locations where mastication is identified as a treatment option under the proposed action (see the body of the resource report). Material will also be expected to decay faster with masticated material due to its proximity to the ground and being saturated for longer period of time during the winter months.

Additional units identified for site preparation generally occur within plantations and natural stands in which trees are generally less than or equal to 14inches diameter at breast height. Similar effects related to reduction of fuel loadings will occur as described above due to the removal of trees during follow-up piling and burning activities.

Snag retention will occur within riparian reserves and identified leave locations in units identified for treatment. No planned salvage harvest will occur in riparian reserves. Snag retention outside of riparian zones will utilize a clumping pattern in order to retain snags which will promote decreased surface fuel loadings outside of these zones. Within snag retention areas and riparian reserves, surface fuel loadings will mirror conditions outlined under alternative 1 (see the body of the resource report).

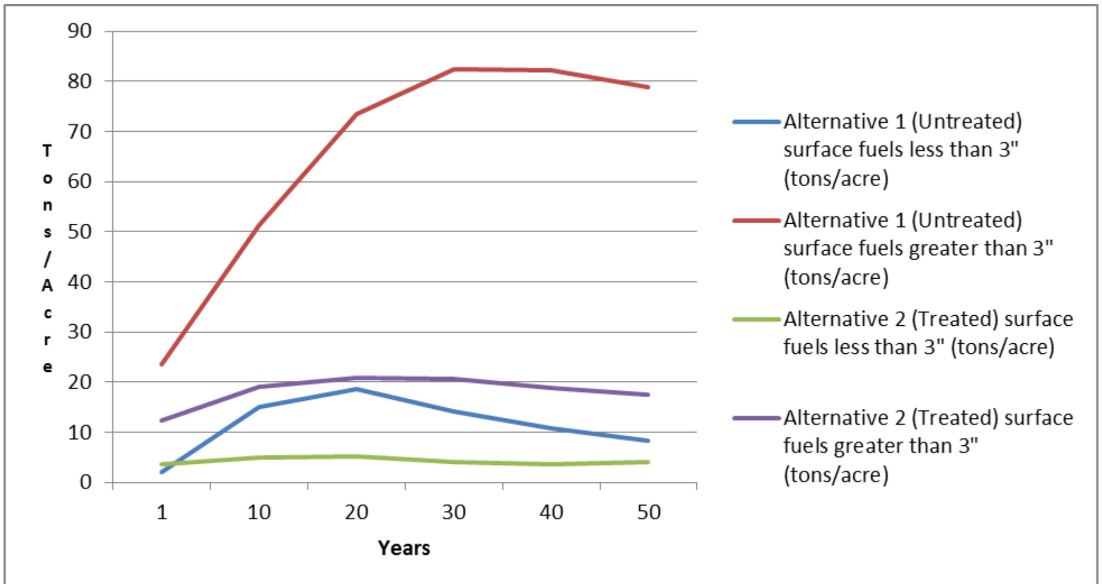
Treating surface fuels upon completion of cutting activities will have a direct effect on reducing surface fuel loading, breaking up of continuous fuel beds and reduction in fuel bed depth. Post-fire logging produces a transient pulse of elevated surface woody fuel loadings followed by a much longer period of reduced surface woody fuel loadings relative to burned stands that are were not logged. Peterson, Dodson, and Harrod (2014) found that post-fire logging altered post-fire fuel succession by (1) greatly accelerating the deposition of surface woody fuels from logged snags, (2) reducing peak loadings of large diameter woody fuels, and (3) initiating the woody fuel decay earlier.

Ritchie, Knapp and Skinner(2012), evaluated salvaged units following the Cone Fire on the Lassen National Forest. They found that after four years higher levels of surface fuel accumulations occurred in lower intensity salvage plots. The highest surface fuel accumulations occurred in un-salvaged plots four to eight years after the fire. Furthermore, the highest levels of large woody debris were associated with un-salvaged areas. A key finding observed by Ritchie, Knapp and Skinner (2012) found no support for the debate that post-fire salvage logging necessitates subsequent fuel treatment for elevated fuels. Under the proposed action, activity generated slash will be piled and burned reducing surface fuels to levels consistent with low severity fire effects.

Post-logging fuel treatments, such as piling and burning, can rapidly reduce total amounts and spatial continuity of surface woody fuels, and may allow logged stands to serve as fuel-breaks in a landscape-level fire management strategy (Peterson and Harrod 2010). After the initiation and completion of the proposed action surface fuels present will consist of the approximate tonnage in each of the size classes, not including large material (downed logs) left on site for wildlife or watershed purposes:

- 1 hour fuels (0 to ¼ inch): 0.6 tons per acre
- 10 hour fuels (¼ to 1 inch): 2.3 tons per acre
- 100 hour fuels (1 to 3 inches): 3.4 tons per acre

Post treatment activities under alternative 2 are expected to significantly reduce large surface fuel accumulations in the future compared to alternative 1. The Fire and Fuels resource report displays projected surface fuel loads predicted over a 50-year period, based on completion of implementation actions. While modeling predicts an expected increase in surface fuels less than 3 inches diameter at breast height as compared to the alternative 1, after implementation of proposed activities, modeling results predict that within ten years alternative 2 will continue to promote low accumulations of surface fuel loadings. Comparatively, taking no action significantly elevates surface fuels for decades. See Figure 3-1which shows a representative stand from the Walker Creek Drainage with, and without salvage harvest and treatment of activity fuels. Salvage logging and treatment of activity fuels significantly reduces future fuel loading, particularly in fuels greater than 3inches in diameter.



Walker Creek Stand ID 050552ABCD0292						Walker Creek Stand ID 050552ABCD0292					
Year	Surface Fuel < 3" dbh (tons/acre)	Surface Fuels > 3" dbh (tons/acre)	Intensity (btu/ft/sec) 26 ch/hr	Intesity (btu/ft/sec) 40 ch/hr	Resistance to Control	Year	Surface Fuel < 3" dbh (tons/acre)	Surface Fuels > 3" dbh (tons/acre)	Intensity (btu/ft/sec) 26 ch/hr	Intesity (btu/ft/sec) 40 ch/hr	Resistance to Control
1	2.10	23.61	87	87	Low	1	3.62	12.28	69	69	Low
10	14.95	51.34	5379	8213	Extreme	10	5.00	19.10	1901	2902	Moderate
20	18.57	73.51	7199	10991	Extreme	20	5.28	20.90	2046	3124	Moderate
30	14.20	82.47	6902	10537	Extreme	30	4.08	20.65	1821	2781	Low
40	10.81	82.30	6291	9605	Extreme	40	3.52	18.92	1630	2489	Low
50	8.21	78.92	5650	8626	Extreme	50	4.06	17.42	1645	2512	Low

Figure 3-1: Representative stand from the Walker Creek Drainage with, and without salvage harvest and treatment of activity fuels.

Roadside hazard treatments increase the safety of accessing the forest, by reducing the potential for dead trees to fall across National Forest system roads and within recreation sites. Trees removed offsite reduce surface fuel loadings adjacent to road systems and allow for safe ingress/egress within fire area road systems.

Hazardous fuels treatments occur both within the wildland-urban interface and strategic road and ridge systems which fire suppression resources used historically to control unplanned fires and implement prescribed fire activities.

Proposed thinning with follow up pile burning, lop and scatter or chipping decreases surface fuel loadings to a desired conditions of less than ten tons/acre (less than three inch diameter fuels), removes small diameter trees which reduces ladder fuels, and increases canopy base heights of retained green trees. Reduction in surface fuels in conjunction with increasing canopy base heights will reduce flame lengths and crown fire initiation of natural or planted trees.

Prescribed fire as a "second-entry" post fire is planned on approximately 11,570 acres. A mixed severity burn pattern occurred within units proposed for burning. Direct effects of prescribed fire include the consumption and subsequent reduction in surface fuels. Prescribed fire activities naturally prune the lower branches of trees by burning the live and dead needles and small branch wood effectively increasing the canopy base heights.

Depending on seasonality, 100 and 1000 hour fuels (greater than 1” in diameter) and retained snags can be partially or fully consumed. A mosaic burn pattern will be expected due to post fire burn severity patterns.

Fire Behavior Synopsis

When compared to alternative 1, proposed treatments in alternative 2 effectively reduce fuel loading in the short and long term which in turn reduces fire behavior. Similar fire behavior is expected for the first one to three years due to the lack of surface fuels to support the spread of fire. However, immediate actions taken to reduce standing dead trees will reduce fire behavior (flame length, fireline intensity, and spot fire potential) long term.

Within ten years, reductions in surface fuel loadings, as a result of planned activities, have the potential within proposed treatment areas to:

- Reduce flame lengths less than four feet
- Reduce fireline intensity less than 100 btu/ft/sec
- Decrease spot fire activity through removal of snags and future fuel loading
- Effectively produce fire behavior such that persons using hand tools can generally attack fires at the head or flanks and handline is sufficient to hold the fire.

The type of fire behavior predicted under alternative 2 will enable ground crews to use direct attack within the units proposed for treatment. Untreated portions of units, such as Riparian Reserves, snag retention pockets or unburned islands from prescribed fire activities, will be expected to produce flame lengths less than four feet and fireline intensities less than 100 btu/ft/sec.

Reforestation efforts will have better chances of survival due to anticipated surface fuel load reductions within planted areas. Using empirical data for northern California forests, Weatherspoon and Skinner (1995) found that when wildfire in natural plantations spreads to an adjacent plantation, fire intensity and damage to the overstory are much lower in plantations where slash has been removed following logging(Peterson, et al., 2009). Until tree age and canopy base heights increase younger conifer and hardwood stands will be susceptible to re-burn and subsequent mortality, even under alternative 2. Younger trees have thinner bark and low canopy base heights allowing for easier transition to crown fire even with predicted flame lengths at less than four feet over the majority of the proposed units. However, after the removal of large surface fuels, higher survival will be expected within stands that continue to have management activities to maintain desired fuel conditions, and as trees increase in size and canopy base heights.

Using projected flame lengths of alternative 1 (see the fire and fuels resource report) and alternative 2 (also detailed in the resource report) along with the relationship of critical flame length needed to generate crown fire activity based on canopy base height (see the resource report), it is anticipated that fuel reduction treatment activities proposed will decrease potential crown fire activity as trees increase in size and shed their lower branches either naturally or through pruning activities. Figure 21 in the fire and fuels resource report displays predicted flame lengths of alternatives 1 and 2 along with critical surface flame lengths required to generate crown fire activity based on the canopy base heights of trees. The reduction of surface fuel loading along with the change in the structure and composition of the fuel bed are anticipated to reduce fire behavior comparatively to taking no action, thus, allowing trees to have increased survivability as canopy base heights increase over time. One figure in the resource report also shows the susceptibility of trees to fire; until trees are able to increase in size along with shedding their lower limbs increasing their separation from surface fuels they remain susceptible to fire caused mortality.

Fire Suppression Capabilities

Removal of roadside hazard trees provides for safe ingress and egress to fires. The reduction of snags and subsequent fuel loadings modifies flame length and fireline intensity which enables direct attack and increases fireline production rates. Increasing fireline production rates decreases resistance to control by removing large fuel accumulations. Moreover, a general reduction in snags will permit safer night-time fireline operations. Tables in the Fire and Fuels resource report compare potential resistance-to-control based on projected surface fuel loads.

Project design features that outline clumping snags effectively achieve fire suppression capability. Clumped snags will allow resources to locate control lines around these areas and safely engage a fire with limited need to fall high densities of snags. Snag retention is planned in areas that are rarely used by fire managers to contain a large fire; for example, snag retention is planned on the lower one-third of slopes, and away from roads and ridgetops that are typically utilized by fire managers to control large fires.

By strategically applying varying post-fire logging treatments within landscapes, post-fire logging could reduce woody fuels and help reduce threats of future wildlife behavior to human health, property, and ecosystem services (Peterson, Dodson, & Harrod, 2014).

The Kyburz Fire (Eldorado National Forest, 2013) provides an example of suppression success within a previously salvaged area. This fire started at the bottom of a slope within the South Fork American River. Diurnal winds fanned the fire up-drainage towards the community of Kyburz, (approximately 1 mile from the fire origin) and re-burned areas within the footprint of the Freds Fire (2004). Treatments within the Freds fire areas included post fire logging activities to help reduce future fuel loading and snag density. The lack of heavy dead and down fuels allowed fire suppression resources to continue to construct direct control lines, keeping a safety zone around them within the “black”. Salvage harvest activities in the previous Freds fire allowed for a lower intensity Kyburz fire, less exposure to hazard trees, and less exposure during mop-up activities (Johnson, 2013). If direct fire suppression tactics had not been available, as a result of post Freds fire treatment and snag reductions, indirect line would have been required during nighttime operations, which would have only allowed for indirect fire suppression tactics and an increase in fire size (Jacobson, 2013). Resources, including aircraft, heavy equipment and personnel were safely able to drop water and retardant in open areas and construct line with minimal large woody debris. These tactics increased line production rates, and decreased resistance to control, allowing for resources to effectively work through the night to complete control lines and keep the fire from entering the community of Kyburz.

Fuel treatments within the wildland urban interface promote safer firefighting actions and public evacuation, should a future large fire occur within the project area. Eliminating high snag densities and treating surface fuels within the WUI has an indirect effect on reducing sources for embers, spotting, and receptive fuel beds. These indirect effects are a benefit in alternative 2, when compared to alternative 1, where no action is taken to reduce future available material. Additionally, increased spotting and radiation would make structures more difficult to defend from crown fire, as opposed to surface fire. (Cohen & Butler, 1996) (Scott & Reinhardt, 2001).

Identified treatments in the WUI modify fire behavior such that fires are anticipated to spread slower, with flame lengths less than four feet, allowing responding resources to take direct action to control fires. These direct actions are effective due to the change in composition and structure of fuels, which promotes low resistance to control when compared to alternative 1.

The 2012 Goff Fire highlights the benefits of fuel treatments in which the objective is to reduce surface fuel loading and modify fire spread and intensity within the WUI. The Seiad Creek Road Shaded Fuel Break project, completed in 2009, was utilized as a control line for the Goff Fire. Fuels treatment contributed to easier holding and burning along Seiad Creek Road in the community of Seiad Valley (Osborne 2015).

Both proposed salvage and hazardous fuels treatments outlined in alternative 2 will produce similar fire behavior, which could support fire suppression resources. Suppression resources would have opportunities to burnout, hold fireline and safely take action on any identified spot fires in the advent of a future large fire occurrence.

Fuel treatments identified along strategic ridge and road systems will enhance future fire management activities including fire suppression, managing unplanned ignitions, and implementation of prescribed fire. Maintaining these treatments provides opportunities for fire managers to focus resources on priority locations, such as in the WUI. These treatments also provides opportunities to utilize confine and contain strategies on future fires where untreated areas still contain high densities of snags and inhibit safe work areas for fire suppression resources.

Cumulative Effects

The Westside Fire Recovery project, in conjunction with ongoing and foreseeable actions, has the potential to increase fire resiliency by managing both unplanned and planned fire ignitions across the landscape, as compared to alternative 1. Furthermore, fire suppression effectiveness is improved as future projects implemented adjacent to and within the project area increase the size and scale of treatments proposed under alternative 2. At the stand scale, post-fire logging reduces surface fuels over the long term, particularly in the large diameter size classes (greater than 3” in diameter), which should increase management options for applying prescribed fire treatments or allowing future wildfires to burn without causing excessive damage to the forest vegetation and soils (Peterson, Dodson, & Harrod, 2014).

Communities affected by the 2014 fires continue to reduce fuels on private property located adjacent to National Forest System Lands. Alternative 2 complements many of these activities to improve fire resiliency, and provides opportunities to enhance the work performed by landowners to improve vegetation and fuel loadings. These combined actions promote less intense fire behavior and promote safer firefighting action in the future, within urban interface fires. The Scott Bar and Seiad Fire Safe Councils are active councils which have coordinated fuels treatments on private and public lands in the past and can be expected to continue these partnerships into the future.

Private timberlands are currently in the process of salvage operations on lands affected by the 2014 fires. Treatments adjacent to private timberlands will increase the size and scale of treatment activities under alternative 2, as well as provide fuel breaks on prominent ridge and road systems that stretch across private and forest system lands within the Beaver Fire. Christmas Tree and Buckhorn Ridge systems are prominent ridgelines within the Beaver fire area that have historically been used to control large fire and where planned activities adjoin private and National Forest lands.

Alternative 3

Direct Effects and Indirect Effects

The direct and indirect effects of alternative 3 are anticipated to be similar to those described within alternative 2, except on fewer acres of salvage harvest (about 5,800). Proposed activities are anticipated to reduce fire hazard and resistance to control. Additional snag recruitment may increase surface fuel loadings in the future where additional snags are left within units; however, within areas that receive treatment, surface fuel loading projections will be comparable to alternative 2. Project design features outlined to leave snags in a clumping pattern, as well as away from strategic fire management features (ridges, roads, etc.), will provide safe and effective fire suppression activities. Similar effects to those of alternative 2 are anticipated within the project boundary of the Happy Camp Complex and Whites fire areas. The smaller size and scale of treatment units within these areas will not reduce the benefits of treatments proposed with alternative 3.

Cumulative Effects

Alternative 3 does not include salvage harvest activity within the Beaver Fire project boundary. Therefore, opportunities to connect fuel treatments which adjoin private land, where salvage and fuel treatments are planned, to the treatments planned on private land are diminished due to the reduction of treatment activities. Ability to reduce fire spread and intensity across the landscape will be decreased. Adding the effects of alternative 3 to the effects of ongoing and reasonable foreseeable future actions is likely to have measurable effects on fire.

Alternative 4

Direct Effects and Indirect Effects

The direct and indirect effects of alternative 4 are anticipated to be similar to those described within alternative 2, except for fewer acres of salvage harvest (about 5,900 acres). Proposed activities are anticipated to reduce fire hazard and resistance-to-control where treatments occur, and fuels reduction activities to reduce fuel loads to less than ten tons/acre are expected.

Cumulative Effects

Adding the effects of alternative 4 to the effects of ongoing and reasonable foreseeable future actions is likely to have measurable effects on fire similar to those of alternative 2. Treatments reduced under this alternative are intermixed within other proposed activities, which still allows for additional buffering to reduce fire spread and intensity adjacent to hazardous fuels treatments.

Alternative 5

Direct Effects and Indirect Effects

Within units that receive treatment, direct effects are comparable to those described within alternative 2 with respect to reduction in fire hazard and resistance to control. Indirect effects vary by fire area due to the reduction in size and scale of salvage harvest activities.

Within the Beaver fire area, additional fuel treatments added as proposed activities are anticipated to modify fire spread and intensity adjacent to private timberlands over a greater portion of the area when compared to alternative 2. Fire managers will also have increased fuel breaks allowing future fire management options to control unplanned fires.

Salvage treatments that will not occur within late-successional reserves are expected to significantly reduce opportunities to modify fire spread, especially within the Happy Camp and Whites fire areas. Many of the units removed under alternative 5 are located adjacent to strategic fire management features (ridges, roads, etc.). The reduction in the size and scale of treatments will most likely allow future fire activity to spread upslope due to anticipated fuel loading and subsequent fire behavior, which is expected to be comparable to alternative 1.

Approximately 3,600 acres are not treated in the WUI under alternative 5. Many of these areas are adjacent to critical control points and communities, for example Highway 96 and the community of Seiad. A primary concern is that any future fires that start above the community and within snag patches and areas with high fuel loading will be more difficult to control and require greater time and effort from resources.

Cumulative Effects

Varying effects are anticipated based on fire area. Similar effects as described under alternative 2 are expected within the Beaver fire area, as there is little late-successional reserve in that area. Also, the additional treatments added in alternative 5 in the Beaver fire area will further enhance fuel treatment effectiveness at the landscape level due to the increase of size and scale of proposed treatments coupled with adjoin private land treatment activities.

Within areas that include sizeable acres of late-successional reserve, the reduction in salvage harvest activities will substantially reduce the size and scale of treatments at the landscape level. Future foreseeable fuels reduction projects may be precluded due to high density of snag patches left on the landscape, making some foreseeable projects difficult to implement. Adding the effects of alternative 5 to the effects of ongoing and reasonable foreseeable future actions is likely to have measurable effects on fire.

Comparison of effects

Table 3-4: Comparison of post-fire effects of alternatives on fire and fuels after ten years

Analysis Indicator	Measurement Indicator	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Fire Hazard:						
Fuel loading of small material (<3")	*Acres with < 10 tons per acre*	14,000	44,800	40,800	41,100	35,200
Flame Lengths	*Acres with flame lengths < 4'*	14,000	44,800	40,800	41,100	35,200
Fireline Intensity	*Acres with < 100 btu/ft/sec*	14,000	44,800	40,800	41,100	35,200
Rate of Spread	*Acres < 20ch/hr*	14,000	44,800	40,800	41,100	35,200
Resistance to Control						
Fuel loading of large material (> 3")	*Acres with greater than 20 tons per acre*	14,000	0	0	0	0

Compliance with law, regulation, policy, and the Forest Plan

All alternatives comply with law, regulation, policy and the Forest Plan pertinent to fire and fuels as displayed in the Forest Plan consistency checklist.

Terrestrial Wildlife

The project is analyzed for its potential effects on wildlife species listed as Endangered, Threatened, or Proposed under the Endangered Species Act; designated critical habitat; Forest Service Region 5 Sensitive Species; Survey and Manage Species (under current consideration), Management Indicator Species, and Migratory Birds (MOU 2008). This section synthesizes the information and analysis for Threatened, Endangered, Forest Sensitive Species, Management Indicator Species, and compliance with Survey and Manage Species, and Migratory Species.

Methodology

The analyses are based on the best[21] scientific and commercial data available at the time this document was written. Information such as data collected from Forest databases, remote sensing vegetation analysis, the Forest existing vegetation (EVEG), direct field

[21] Best available science is defined as scientific literature that is relevant to the project and available to the reader and decision-maker.

assessments, California Natural Diversity Database, and the most recent and appropriate scientific research and species information, was all used for the consideration of direct, indirect and cumulative effects.

Threatened, Endangered, Proposed and Candidate species in the project area are identified using the USDI Fish and Wildlife Service list of Threatened, Endangered, Proposed or Candidate Species (Document #490143515-161248 retrieved on February 11, 2015). The Forest Service (Pacific Southwest Region (Region 5)) Sensitive Species list (revised July 3, 2013) identifies the species to consider for this analysis. Using both lists, a determination is made of whether the species range overlaps the project area and whether habitat is likely to exist in the project area. If both are true, then the species is analyzed for the project.

Special Habitat

Peregrine falcons were delisted under Endangered Species Act in 1999. However, the falcon is not included in the Forest Service Sensitive Species or Management Indicator Species lists. Even though the peregrine falcon is considered to be recovered by the USDI Fish and Wildlife Service, the Forest Plan provision for Special Habitat Management Areas around peregrine falcon eyries for the recovery of the species by managing for high quality habitat has not been amended and will be followed.

The project proposes fuels reduction treatment that occurs within the Special Habitat area. The treatment will reduce the risk of high severity fire and consequently maintain the existing habitat. Therefore, the proposed treatment is consistent with the management of this area and will not be analyzed further for this project.

Analysis Indicators, Spatial and Temporal Context by Status of Species

Threatened and Endangered Species

Northern Spotted Owl

Risk to Reproduction

Risk to reproduction is split into four categories representing the relative levels of effects resulting from each alternative. Using the existing quality and amount of habitat within each core and home range (activity center), the acres of suitable habitat (nesting/roosting and foraging habitat) are calculated as the existing condition for the activity center. The risk to reproduction for each activity center is categorized depending on the amount of habitat in the core and home range (see the Terrestrial Wildlife Biological Evaluation for details on categories).

A high risk means that reproduction is not likely to occur. Moderate level represents the ACs that are likely to have difficulty in finding resources and these owls will likely need to transverse openings (areas without overstory tree canopy) or use areas of low habitat quality to find enough resources. These challenges may result in lower survival or reproduction potential for the pair occupying moderate level ACs. Low level ACs have enough habitat in the core and home range to support reproduction, but the habitat may not be ideally distributed in large patches of high quality habitat. The final category, very low, represents the habitat quality and distribution associated with successful reproduction over the species range.

The spatial bounds of the analysis will be limited to the home ranges that overlap the fire perimeter plus the project area. The short-term (≤5 years) covers the time when the majority of snags will remain standing. The long-term (>10 years) includes the time when the snags will likely start falling, resulting in changes to the physical structure of the area.

Changes to Critical Habitat

The analysis estimates the number of critical habitat acres affected by each alternative. The use of post-fire burned areas for foraging is a point of disagreement in the literature because there is little evidence to support idea that these areas are actually being used for foraging; although owls have been found in these areas, there is no evidence that they are foraging. For the purpose of this analysis, due to the lack of information on how these burned areas are being used, use of post-fire burned areas for foraging will not be discussed further. Given the types of treatment proposed for this project that are likely to maintain or remove habitat, we focus the reporting of effects on downgrading and removing habitat. Habitat removal means the habitat prior to treatment will no longer function as NSO habitat after treatment. NSO habitat is generally described as a hierarchy in habitat quality with nesting/roosting being the highest quality and foraging and dispersal following in order; habitat downgrading signifies the lowering of a habitat quality from one level to the next.

The spatial boundary is all of the areas designated as critical habitat within the analysis area. The analysis area is the same as the spatial bounds described in the Risk to reproduction. The temporal bounds will be the same as for Risk to Reproduction.

Forest Sensitive Species

Bald Eagle

Level of Disturbance to Nest/Roost Sites

Disturbance will be assessed as a distance from the known nest sites. Any level of disturbance less than 1,000 feet from a known nest is a high level of disturbance. Disturbance that occurs between 1,000 feet and 1,500 feet of the nest is a moderate disturbance. A low level of disturbance is any noise producing activity that is farther than 1,500 feet from known nests. For this analysis, a high level of disturbance will likely result in an eagle pair abandoning the nest. Moderate level of disturbance will result in the adults leaving the nest for a short period of time; this may result in delayed feeding of young or not incubating the egg(s). Low level of disturbance may result in the adult eagles displaying behavior indicating acknowledgment of the human activity but the adults continue to feed offspring.

The spatial boundary of the analysis is known nest sites in the project area plus a 1,500-foot buffer. The temporal bounds for the short-term will be the time during implementation (about five years) during the reproductive period (January 1 to August 1) and roosting period (November 1 to March 31); long term will be ten years.

Risk to Future Potential Nest Areas

The analysis indicator illustrates the risk to potential nest areas from the project activities. All salvage or roadside treatments are assumed to remove nesting habitat. If less than ten percent of the nesting habitat is removed, the level of risk is low. If between ten percent and 25 percent of the nesting habitat is removed, the risk is moderate; if more than 25 percent is removed the risk is high.

A low level of risk will result in a distribution of potential nest trees that will likely provide ample opportunity for a new nest site. Moderate level of risk will result in fewer potential nest trees. High level of risk may result in the eagle not finding another nest tree near the current nest tree; thus, the eagles may need to leave the drainage.

The analysis assumes that future potential nest areas will be within 0.5 miles of the known nests. If the nest is greater than 0.5 miles from the river then the analysis area includes the area between the buffer and the river as well. The temporal bounds for the short-term will be the time during implementation (about 5 years) and long term will be ten years.

Northern Goshawk

Level of Disturbance to Nest Sites

Loud noises further from the nest site are expected to create less disturbance than the same noise closer to the nest. Disturbance will be assessed as a distance from the known nest sites. If there are any treatments within 500 feet of a known nest site during nesting period (March through August), the level of disturbance is high. Treatments between 500 feet and 0.25 miles of the nest during the nesting period will lead to a moderate level of disturbance; greater than 0.25 miles from known nests during the nesting period is a low disturbance.

Low level of disturbance means that the nesting goshawk is not likely to respond to the noise; thus, the noise will not reduce the likelihood of the success of the nest. Moderate level of disturbance is likely to result in one of the adults alarm-calling and possibly flying toward the noise, thus reducing the time spent foraging to feed the offspring. A high level of disturbance will likely result in both adults moving toward the source of the disturbance and displaying aggressive behavior; this may lead to the nest being abandoned.

The spatial boundary for the analysis is 0.25 miles from all known goshawk nest sites. The nest sites considered for this analysis have the foraging zone that overlaps the project area. The short-term and long-term temporal bounds are five years and 10 years, respectively.

Risk to Reproduction

The amount and quality of nesting habitat can affect successful reproduction. Risk to reproduction is analyzed using the amount of habitat in each primary nest zone (0.5 mile from nest) and the foraging habitat zone (one mile from nest). The smaller the number of acres in each zone, the greater the risk to reproduction (see the Terrestrial Wildlife Biological Evaluation for details).

A high level of risk will result in a nesting pair of goshawks not finding enough resources to successfully produce offspring and contribute to the population. A moderate risk may provide enough habitat to raise offspring but the pair may spend more time foraging for food; this may be more difficult for nests with more than one chick. A low level of risk will provide enough habitat and diversity of habitat to find sufficient resources to produce a successful nest.

The spatial bound for the analysis is 1 mile from known goshawk nest sites. The nest sites considered for this analysis have the foraging zone that overlaps the project area. The short-term temporal bound is the time for project implementation (about five years) and the long-term temporal bound is ten years.

Fisher, Marten, and Wolverine

Fisher, marten, and wolverine occupy similar habitat of late-successional, dense conifer forest. These species are commonly found at different elevations with some overlap. Fishers are commonly observed on the lower 2/3 of the slope while martens occupy higher elevations with true fir vegetation types. Wolverines have not been observed on the Forest for several years. There is very little information on wolverines in California, but wolverines are suspected to use the true fir to alpine zones. However, all three of these species move across the landscape and use higher or lower elevation conifer forests even though the elevation being used may be outside the average elevation range for the particular species.

Connectivity of Habitat

For this analysis, connectivity will be assessed by measuring the change in gap distance between areas that provide the necessary cover to avoid predation.

- High level of connectivity is when the average gap distance is less than 160 feet.
- Moderate connectivity is when the average gap distance is between 160 and 460 feet.
- Low connectivity is when the gap distance is between 460 and 600 feet; very low connectivity is when gap distance is more than 600 feet.

High connectivity means that there is sufficient habitat to provide cover for fisher, marten, and wolverine moving within a 7th field watershed. Moderate connectivity means there is some challenge to the species moving within a 7th field; this increases the risk to mortality and requires extra expense of energy to deviate around large openings. Low connectivity presents a great challenge because these species are likely to shift their territory to a more contiguous placement of habitat or move through areas with little to no cover. The final category, very low connectivity, represents a situation where openings exceed the gap distance that would let these species move through a 7th field watershed; risk to survival is substantially increased.

The spatial boundary for the analysis is the 7th field watersheds within the project area because this scale represents the area that is likely to affect movement within a home range or dispersal of individuals. The short-term temporal bound is the time during implementation (about five years). The long-term is >20 years to represent the time when the snags will begin to fall over and connectivity may decrease.

Change in Home Range

The amount of habitat in each 7th field watershed is assessed for this analysis in its current post-fire condition. If more than 50% of the watershed contains denning/resting or foraging habitat, and more than 80% of the watershed contains denning/resting, foraging and movement habitat, the 7th field watershed contains a viable home range. If the watershed does not meet these criteria, it is assumed that the 7th field watershed does not contain a home range.

The effect of a loss of a home range is difficult to estimate in terms of population viability. Habitat lost is difficult to replace and it may take many years before the area develops into habitat again. However, this analysis doesn't use true home ranges; rather, the analysis provides a metric to display the potential effects. The loss of one home range may not have large effects on the population, but the loss of several home ranges can result in large effects to the population.

The spatial bound is the 7th field watersheds that intersect the project area. The 7th field watershed is used because the size of the watershed fits within the range of a female fisher's home range and it is a natural division in the landscape.

Pallid Bat, Townsend's Big-eared Bat, and Fringed Myotis

Risk of Disturbance to Roost Sites

The project area doesn't contain any known bat hibernacula or maternity roosts but does have caves and mines that can provide habitat for bats that do exist in the project area. A hibernaculum (plural: hibernacula) is usually a cave or mine that provides a constant temperature and protection for bats during the winter months. A maternity roost is a place where bats give birth and rear their young; maternity roosts can occur in a variety of structures such as caves or abandoned buildings. In order to account for the potential existence of an undiscovered hibernaculum and maternity site, geological mapping is used as a proxy to locate bedrock that typically contains caves (marble/limestone deposits). For mining activity, Forest mining data is used to identify the type of mine and locations. Using the combination of the geological data and mining data, a 250-foot buffer is created for a distance from all potential areas that may contain cave and cave-like structures (possibly containing a maternity roost or hibernaculum); the location of this buffer is overlaid with project activities for each alternative to estimate affects to these bat species.

If treatment occurred within 250 feet of the potential hibernaculum or maternity site, the risk of disturbance is high. If there is only treatment between 250 feet and 1,320 feet of the potential site, the risk of disturbance is moderate. If treatment occurs more than 1,320 feet from the potential site, the risk of disturbance is low.

High risk of disturbance may result in a maternity roost being abandoned with the fate of the offspring likely dependent on their age. High disturbance of a hibernaculum will likely result in all bat ages leaving the warmth of the cave to the colder outside; this may result in death of the bats. Moderate risk of disturbance is not likely to affect the maternity roost or hibernaculum but instead disturb individuals that come and go from the cave (excluding the winter months). Low risk of disturbance will be potentially moving a very few individuals from a foraging area but no disturbance of the hibernaculum or maternity roost.

The spatial bound for these bat species is 0.25 miles around all potential hibernacula and maternity roosts within the project area. The temporal bound is about five years for the short-term representing the time during implementation and greater than ten years for the long-term.

Willow Flycatcher

Level of Habitat Alteration

This analysis will estimate the amount of habitat disturbed by the proposed activities; the level of effect will be presented in acres and in proportions of habitat affected, based on the 7th field watershed scale. Habitat for the species is assumed to be 3rd order streams (extent or location of resident trout used as a proxy) and wet meadows (mapped springs used as a proxy). If more than ten percent of the habitat is disturbed the level of habitat alteration is high. If between five percent and ten percent of habitat is disturbed, this is a moderate level of habitat alteration. If less than five percent of the habitat is disturbed, the level of habitat alteration is low.

High level of habitat alteration will likely affect flycatcher reproduction for a given 7th field watershed and possibly an entire population. Moderate level will likely affect a small number of territories and possibly affect a portion of a population. Low level of habitat alteration may affect individuals but the population is not likely affected.

The spatial bound is the 7th field watershed. The temporal bound in the short-term is about five years and long-term is ten years.

Siskiyou Mountains Salamander

Risk of Disturbance

The Siskiyou Mountains salamander’s range overlaps one subunit (Happy Camp) of the project area. This area has been surveyed for the species and several known sites exist. Many of these known sites were affected by the 2014 wildfire. Treatment is proposed in areas that burned at high severity and have lost most or all the canopy cover. Even though canopy cover is considered a critical component for Siskiyou Mountains salamander habitat, canopy cover was not analyzed because very little canopy cover is expected to be affected by project activities. Instead, this analysis will focus on assessing the level of risk to local populations based on the amount of habitat disturbed by treatment.

If more than 25 percent of the known sites are disturbed by the project, the risk of disturbance is high. If between 20 percent and 25 percent of known sites are disturbed, the risk of disturbance is moderate; if less than 20 percent of the known sites are disturbed, it is considered a low risk of disturbance.

A high risk of disturbance would include a large proportion of known sites being affected by the use of heavy equipment during project activities that disturb habitat and likely result in negatively affecting the population. The moderate level may include effects to localized areas and the population as a whole but to a lower magnitude than high risk. Low risk will affect individuals but it is not likely to affect the population.

The spatial bound will be defined by a 130-foot buffer around all known sites. The temporal bound in the short-term is the time during implementation about five years. The long-term is greater than ten years.

Tehama Chaparral Snail

Likelihood of Dispersal

Areas affected with high severity wildfire are not likely to support a snail population, and snails are likely to disperse to less-affected habitat. This analysis will use the pre-fire GIS habitat layer and known sites where snails have been located to identify treatment units that may contain snails. The amount of woody debris (>12 inches in diameter) will equate to the likelihood of snails being able to disperse to viable habitat. If there are more than seven logs (greater than 12 inches in diameter) the likelihood of dispersal is high. If there are five to seven logs per acre, the likelihood of dispersal is moderate. If there are fewer than five logs per acre, the likelihood of dispersal is low.

High likelihood of dispersal means that there will be a sufficient amount of woody debris to provide cover and moist conditions for snails to move from one location to another. Moderate likelihood of dispersal will provide enough woody debris for snails to move through part of the area but open areas that impede movement or reduce potential survival are likely to be present. Low likelihood of dispersal means little continuous cover is present and there is a lower survival of individuals, with the possibility of severing connectivity between populations of snails.

The spatial scale is the Happy Camp and Beaver project areas. The temporal scale is about five years, which is the time for implementation. Long-term is >20 years.

Western Bumble Bee

Level of Habitat Disturbance

The western bumble bee, like other species of bumble bees, is sensitive to habitat disturbance. In the project area, high-quality habitat for bees is likely to occur in the meadows where several species of flowering plants occur. Meadows also offer a high density of plants to provide additional structure and small animal burrows that bees also use for nesting. Heavy equipment and tree harvest are the most likely source of ground disturbance in this project. If more than five acres of meadow habitat will be disturbed by ground-based equipment, the level of disturbance is high. If one to four acres of meadow are disturbed, the level of disturbance is moderate. If less than one acre of meadow is disturbed, the level is low.

A high level of disturbance will result in affecting at least one bee colony where reproduction will be compromised. Moderate level of disturbance will result in removing flowering plants or preventing bees from using an area because of activities. This will result in bees traveling further to find food resources if a colony is present within close proximity to the treatment. A low level of disturbance will be a temporary interruption of bee activities lasting a few hours but bees will return to the area.

The spatial bound is the meadows within the project area. The temporal bound in the short-term is about five years (during the period when implementation is expected to occur and bees may be disturbed) and long-term is ten years.

Management Indicator Species

The requirement to evaluate landscape and project-level impacts to habitat conditions associated with species associations and related management indicator species is identified in the Forest Plan (page 4-39). Habitat monitoring requirements are summarized in the Management Indicator Species Report Part I. “Habitats” are the vegetation types (for example, mixed conifer forest) and/or ecosystem components (for example, river and ponds) and special habitat elements (for example, snags) identified in the Forest Plan. “Habitat status” is the current amount of habitat on the Forest. For the post-fire assessment of habitat, the Rapid Assessment of Vegetation Condition after Wildfire (RAVG) data is used (see maps A-2, A-19, and A-24 in appendix A).

Project-level effects on management indicator species are analyzed and disclosed by examining the impacts of the proposed project on habitat for management indicator species by discussing how direct, indirect, and cumulative effects will change the quantity and/or quality of habitat in the analysis area for each habitat association. For this analysis, the following analysis indicators are used to determine the level of effects.

Hardwood-Associated Species

Change in hardwood habitat abundance

Overlaying treatment prescriptions for each defined treatment unit with the defined habitat results in estimating the acres of hardwood habitat affected by the treatment and the levels of effects to the habitat (whether habitat will be degraded or removed). Degraded hardwood habitat means that physical structures are changed to the point that the quality of the habitat is lessened. Removed habitat is no longer functioning as habitat as a result of proposed activities or events. For each alternative, the acres of habitat affected are reported for each habitat association.

Spatial bounding for the hardwood associated species is defined by the project area. The temporal bound for the hardwood associated species is five years for the short-term to include the expected time to complete implementation of the project. The long-term spatial bound is ten years which will capture the anticipated fire affected vegetation response (e.g. hardwood regeneration).

Snag-Associated Species

Change in snag habitat abundance

The analysis of habitat is the same as for hardwood associated species except with a focus on snag habitats[22]. Spatial bounding for snag-associated species is defined by the project area. The temporal bound for snag associated species is five years for the short-term to include the expected time to implement the project. The long-term spatial bound is ten years which will capture the anticipated fire affected vegetation response (e.g. the time for most or all snags to fall over).

[22] Snags ranging in diameter and distribution in the project area were created by the 2014 fires. The current conditions resulting from these fires include a particular type of habitat that is favorable to some wildlife species. One of those species, the black-backed woodpecker, occurs in the snag species association for this project. It is a well-studied species that uses stands of dense trees that are affected by high-severity fires. Although habitat for black-backed woodpeckers may be affected by this project, the snag association was chosen as a management indicator to represent the use of true fir habitat, not the use of fire-affected areas. Therefore, effects of the project on snag associated species are analyzed based on the assigned habitat type for each species as described in the Forest Plan.

Survey and Manage

Each alternative is evaluated in terms of how the proposed activities will meet the requirements of the species-specific management recommendations if known sites of survey and manage species are present, and how the project will comply with the 2001 Record of Decision (USDA 2001) and the 2001, 2002, and 2003 annual species reviews. Requirements of the 2001 Record of Decision include management of known sites as recommended by species review and conducting pre-disturbance surveys of potential habitat and managing any discovered sites for Siskiyou Mountain salamander and Tehama chaparral snail (both analyzed as sensitive species), and the blue-gray taildropper. It is assumed that pre-fire habitat that burned with high or moderate vegetation-burn severity is no longer habitat so pre-disturbance surveys will not be completed. The analysis indicator for effects on survey and manage species is the number of known sites affected by the project activities.

For action alternatives (2, 3, 4, and 5) the spatial boundary will be limited to the treatment units. For alternative 1, the spatial boundary will be the same as alternative 2 since this alternative has the maximum footprint of treatment. The short-term temporal bounds will be limited to the time for each activity to be implemented which is about five years. The long-term bound will be 20 years.

Table 3-5: Analysis Indicators, Spatial and Temporary Boundaries by Species

Species	Status	Analysis Indicator	Spatial Boundary	Temporal Boundary
Northern spotted owl	Federally-listed as Threatened	Risk to Reproduction	Home ranges that overlap fire perimeter	Short-term = ≤ 5 years Long-term = >10 years
		Changes to Critical Habitat	Area designated as critical habitat within the home ranges that overlap the fire perimeter	Short-term = ≤ 5 years Long-term = >10 years
Bald eagle	Forest Service Sensitive	Level of disturbance to nest/roost sites	Known nest sites plus a 1,500-foot buffer around known sites in the project area	Short-term = ≤ 5 years during reproductive period (Jan. 1 to Aug. 1) and roosting period (Nov. 1 to Mar. 31) Long-term = >10 years
		Risk to future potential nest areas	Within ½ mile of known sites and the area between the nest and a river if the known nest is greater than ½ mile from a river in the project area	Short-term = ≤ 5 years Long-term = >10 years
Northern goshawk	Forest Service Sensitive	Level of disturbance to nest sites	¼ mile from all known goshawk nest sites (foraging zone overlap the project area)	Short-term = ≤ 5 years during reproductive period (March 1 to August 31) Long-term = >10 years
		Risk to reproduction	1 mile from known goshawk nest foraging zone that overlap the project area	Short-term = ≤ 5 years Long-term = >10 years
Fisher, Marten, Wolverine	Forest Service Sensitive	Connectivity of habitat	7th field watersheds that intersect the project area	Short-term = ≤ 5 years Long-term = >20 years

Species	Status	Analysis Indicator	Spatial Boundary	Temporal Boundary
		Changes in home range	7th field watersheds that intersect the project area	Short-term = ≤ 5 years Long-term = >20 years
Pallid Bat, Townsend's Big-eared Bat, Fringed Myotis	Forest Service Sensitive	Risk of disturbance to roost sites	¼ mile around all potential hibernaculum and maternities in project area	Short-term = ≤ 5 years Long-term = >10 years
Willow Flycatcher	Forest Service Sensitive	Level of habitat alteration	Meadow and riparian (3rd order streams or greater) within project area	Short-term = ≤ 5 years Long-term = >10 years
Siskiyou Mountains Salamander	Forest Service Sensitive and Survey and Manage Species	Risk of Disturbance	130-foot buffer around all known sites in project area	Short-term = ≤ 5 years Long-term = >10 years
Tehama Chaparral Snail	Forest Service Sensitive and Survey and Manage Species	Likelihood of dispersal	Boundaries of Happy Camp and Beaver project areas	Short-term = ≤ 5 years Long-term = >20 years
Western Bumble Bee	Forest Service Sensitive	Level of habitat disturbance	7th field watersheds that contain meadow features in the project area	Short-term = ≤ 5 years Long-term = >10 years
Hardwood-Associated Species	Management Indicator Species	Change in hardwood habitat abundance	Project area	Short-term = ≤ 5 years Long-term = >10 years
Snag-Associated Species	Management Indicator Species	Change in snag habitat abundance	Project area	Short-term = ≤ 5 years Long-term = >10 years
Survey and Manage Species	Survey and Manage Species	Habitat protection	Potential treatment units	Short-term = ≤ 5 years Long-term = >20 years

Affected Environment

Threatened and Endangered Species

Northern Spotted Owl

Risk to Reproduction

Based on habitat in known cores and home ranges remaining after the 2014 fires, about 80 percent of the activity centers analyzed in the project area is at a moderate or high risk to reproduction. The "high" risk activity centers in the project area are not likely to produce any offspring because the core and home range aren't expected to provide enough of the resources needed to support the adults and offspring. Northern spotted owl breeding pairs in "high" risk activity centers may move to other locations with more habitat and possibly reproduce there. The "moderate" risk activity centers may produce offspring but the owl will likely need to use low quality habitat or unsuitable habitat to find enough resources. The "low" and "very low" risk levels contain enough habitat to support reproduction.

Table 3-6: The level of risk to northern spotted owl (NSO) reproduction given the current condition of the core and home range for known activity centers

Risk to Reproduction	Number of NSO Core/Home Range
Very Low	3
Low	14
Moderate	51
High	12

Changes to Critical Habitat

The project area overlaps with four NSO critical habitat subunits: Klamath East 6 and 7 and Klamath West 7 and 8. Given the 2014 fire severity and pre-fire habitat, KLE6 likely lost the least amount of habitat while KLE7 likely lost the largest amount of NSO critical habitat acres.

Table 3-7: Critical Habitat Acres by Northern Spotted Owl Habitat Type

Critical Habitat Subunit	Critical Habitat area in Analysis Area	Northern spotted owl habitat types		
		Nesting/roosting	Foraging	Dispersal
KLE6	7,693	1,996	1,579	1,381
KLE7	41,513	7,944	8,466	7,967
KLW7	26,462	2,334	6,009	7,853
KLW8	27,548	6,273	7,174	6,069

Forest Sensitive Species

Bald Eagle

Four bald eagle nest sites and three winter roost sites are known to exist along the portions of the Klamath and Scott Rivers that occur within the project area. All four nest sites have been active recently and are likely to continue to be active.

Although the 2014 fires burned large areas, only two of the four nest sites were burned. One eagle nest near Seiad Valley and one nest near Hamburg had a mix of fire severity in the area near the nest site. Although fire can kill the nest tree, a dead tree can continue to support a nest for many years. The four nest sites contain about 322, 244, 354, and 197 acres, respectively, of trees large enough to support a future nest if the trees have the desired characteristics. The winter roost sites are less predictable because the eagles don’t appear to have a dedicated tree or clump of trees in which they roost but rather use a general area.

Northern Goshawk

Eleven goshawk nests have been occupied at some point in the last twenty years within or near the project area. All eleven nests have been affected by the 2014 fires but the level of effects to habitat from the fires is variable. Consequently, only one of the eleven nests meets the Forest Plan standard and guideline (page 4-29) for habitat minimums. Unlike most of the nests, this nest is mostly outside the fire perimeter and the fire created only small changes in habitat abundance.

Fisher, Marten, and Wolverine

Fishers appear to be common on the west side of the forest and there have been many observations of fishers near or within the project area over the last 20 years. General surveys have been conducted on the west side of the Forest using baited trip cameras and positive detections have been made at many of the stations within the project area.

Despite many attempts with camera traps, wolverines have not been detected on the Forest for several years. The last recorded observation was in the early 1980's according to the California Department of Fish and Wildlife database. There are sixteen documented detections of wolverines on the Forest but no den sites or evidence of reproduction has been found. The lack of recent detection may be related to a lack of wolverines or to the elusive nature of the species.

Marten are not likely to occur in the project area but their habitat does exist at higher elevations (>4,500 feet) in the project area; for purposes of this project analysis, the assumption is made that marten are present at >4,500 feet elevation.

Connectivity of Habitat

For this analysis, 67 7th field watersheds were analyzed, none of which have high habitat connectivity, partly or mainly due to the 2014 fires that removed many acres of habitat and the number of naturally occurring openings in the project area. Almost half (30) of the watersheds have moderate connectivity while the remaining 37 watersheds have low (16) or very low (21) habitat connectivity. Past fires that created large openings in a given watershed are among the causes of the number of watershed with low or very low connectivity.

Change in Home Range

The 67 watersheds analyzed for this project include 25 watersheds with enough habitat to support a home range or contribute to a home range. The remaining 42 watersheds have too many open areas (many of which were created by the 2014 fires) or do not have enough acres of denning/resting and foraging habitat.

Pallid Bat, Townsend's Big-eared Bat, and Fringed Myotis

The project area contains no known bat hibernacula or maternity roost sites and there are no records of these three species existing in the area. Although the occurrence of a bat hibernaculum or maternity roost is unlikely to occur, habitat is available since bats use open buildings, bridges, mines, or caves, all of which are present in the project area. In the analysis area, there are 58 sites identified containing a cave, mine, or the potential to contain either of these structures.

Willow Flycatcher

The distribution and amount of willow flycatcher reproduction is not well known on the Forest but reproduction is possible. Willow flycatchers are assumed to be present for the purposes of this analysis; if reproduction occurs, it is most likely in riparian reserves in generally 3rd order streams or larger waterways. Although many acres of riparian habitat were burned at high severity by the 2014 fires, the larger waterways are not likely to have burned with high severity effects. Patches of willow habitat were consumed by the fire while other areas were not burned or burned with low-severity effects. Generally, the effect of fire on potential willow flycatcher habitat is mixed and patchy in most areas while habitat is completely removed in a few areas.

Siskiyou Mountains Salamander

The Siskiyou Mountains salamander has a narrow species range; about 25% of its range overlaps the Happy Camp fire-related area. There are 48 known sites within the project area and many of these sites occur in areas of small-sized talus with dense conifer canopy cover that creates cool, moist conditions. Most of these sites have experienced high and moderate severity fire from the 2014 fires that removed all or most of the tree canopy cover. The lack of canopy cover will likely create conditions at the sites that are hot and dry. Changes in temperature and moisture will likely make conditions difficult for the salamanders to persist but vegetation that is left or returns and large woody debris may offset these conditions. These sites have not been surveyed after the fire but it is likely that these sites are still occupied.

Tehama Chaparral Snail

The Tehama chaparral snail is not common on the Forest but has been found in talus habitat with canopy cover from conifer or hardwood trees. There are three known sites of the snail in the project area. Generally, known sites are located on southerly aspects close to riparian areas. The area outside the riparian areas around the known sites is much drier than the area within riparian areas; therefore, riparian areas are likely to be important for this species. The general area that appears to best fit the snail habitat description burned mostly at low and moderate severity in riparian areas during the 2014 fire. Given the association of this species with riparian habitat, the species may have pockets of remaining high quality habitat.

Western Bumble Bee

The western bumble is likely to occur over much of the Forest although it has only been incidentally observed. The actual distribution of the bee on the Forest is not known. Although the species is not exclusively associated with meadows, there is a strong relationship with its habitat needs and meadows. Meadows can occur on the Forest at almost any elevation possible, but the majority of the meadows in the project area occur above 4,000 feet in elevation. The elevation range and the differences in aspect can provide bumble bees with a diversity of flowering plants.

Management Indicator Species

Hardwood-Associated Species

Hardwood habitat abundance

The project area contained about 10,000 acres of hardwood habitat before the 2014 fires; about 50% of these acres burned with high to moderate severity effects. Hardwoods that burn at high severity are usually a complete loss of habitat for the hardwood-associated species. This doesn’t mean that these species will not enter a hardwood stand that burned with high severity effects to retrieve their food caches but the lack of canopy cover in these areas doesn’t provide much escape cover to avoid predation. Plus, these species rely on the acorn mast as a food source; without live hardwoods, these species may need to move to other areas in search of food. However, some of the hardwoods do re-sprout after a fire and may produce a mast in about ten years. Hardwood re-sprouting is already evident in the project area.

Snag-Associated Species

Snag habitat abundance

The project area contained about 130,000 acres of mid to late-seral forest before the 2014 fires; about 40% of these acres burned at moderate and high severity. Habitat shifted to early seral or low quality habitat with an increase in snag density as a result of the fires.

Many of the cavity-nesting, snag-associated species that potentially occur in the project area have interdependent and complex life cycles that rely specifically on this habitat type. The abundant selection of snags can provide primary cavity nesters the opportunity to construct several cavities that will in turn provide secondary cavity nesters more potential nest sites.

Survey and Manage

Prior to the fire, a large portion the project area likely provided habitat for survey and manage species. However, in the area that burned with moderate and high severity effects in the 2014 fires, with the loss of canopy cover, decaying large coarse woody debris and leaf litter to provide micro-site conditions, persistence for most of the mollusk and salamander sites is not likely. Therefore, only habitat that burned at very low and low severity is expected to contain the survey and manage species.

Table 3-8: Affected Environment Summary

Species	Status	Analysis Indicator	Measurement	Results
Northern spotted owl	Federally-listed as Threatened	Risk to Reproduction	Number of cores/home ranges with very low risk	1
			Number of cores/home ranges with low risk	18
			Number of cores/home ranges with moderate risk	11
			Number of cores/home ranges with high risk	50
Northern spotted owl	Federally-listed as Threatened	Changes to critical habitat	Acres by habitat by critical habitat unit:	KLE6 = 7,693; KLE7 = 41,513; KLW7 = 26,462; KLW8 = 27,548
			Nesting/roosting	KLE6 = 1,968; KLE7 = 6,921; KLW7 = 2,149; KLW8 = 5,875
			Foraging	KLE6 = 1,545; KLE7 = 8,074; KLW7 = 5,458; KLW8 = 6,837
			Dispersal	KLE6 = 1,376; KLE7 = 7,925; KLW7 = 7,638; KLW8 = 5,947
Bald eagle	Forest Service Sensitive	Level of disturbance to nest/roost sites	Number of known nesting sites and acres of trees large enough to support a future nest	Four sites, two of which burned

Species	Status	Analysis Indicator	Measurement	Results
		Risk to future potential nest areas	Number of known winter roosting sites	Three winter roost sites
			Number of known nesting sites with acres of trees large enough to support a future nest	Four sites: 322, 244, 354 and 197 acres
Northern goshawk	Forest Service Sensitive	Level of disturbance to nest sites	Number of occupied nests and number that meet habitat minimums	11 sites known to be occupied in last 10 years; 1 nest mostly outside fire perimeter that meets habitat minimum after 2014 fires
Fisher, Marten, Wolverine	Forest Service Sensitive	Connectivity of habitat	Watershed analyzed and connectivity determined	67 watershed analyzed; 0 have high habitat connectivity; 30 have moderate connectivity; 16 have low; and 21 have very low connectivity
		Changes in home range	Watershed with habitat to support a home range	25 watersheds
Pallid Bat, Townsend's Big-eared Bat, Fringed Myotis	Forest Service Sensitive	Risk of disturbance to roost sites	Known hibernacula and maternity sites and potential sites	0 known sites; habitat possible in 58 mines, bridges and caves but these are unlikely to provide structure for bats
Willow Flycatcher	Forest Service Sensitive	Level of habitat alteration	Riparian areas associated with 3rd order streams	Habitat removed by fires in only a few areas; mixed and patchy in most areas
Siskiyou Mountains Salamander	Forest Service Sensitive and Survey and Manage Species	Risk of Disturbance	Known sites and remaining habitat	48 known sites and the 2014 fires removed most or all of the tree canopy cover leaving very little habitat; sites are unlikely to be occupied
Tehama Chaparral Snail	Forest Service Sensitive and Survey and Manage Species	Likelihood of dispersal	Known sites and remaining habitat	3 known sites in areas that burned at low and moderate severity. High quality riparian habitat may remain
Western Bumble Bee	Forest Service Sensitive	Level of habitat disturbance	Meadow habitat	Some habitat remaining, primarily above 4,000 feet in elevation
Hardwood-Associated Species	Management Indicator Species	Change in hardwood habitat abundance	Hardwood habitat quality remaining after fires	10,000 acres before 2014 fires but little habitat remaining that has adequate canopy cover in the 50% that burned with moderate to high severity; future re-sprouting in 10 years
Snag-Associated Species	Management Indicator Species	Change in snag habitat abundance	Snag habitat quality remaining after fires	130,000 acres of mid- to late-seral forest provided habitat before the 2014 fires, 40% of which burned at moderate to high severity resulting in low quality habitat or a shift to early seral habitat with an increase in snag density

Species	Status	Analysis Indicator	Measurement	Results
Blue-gray Taildropper	Survey and Manage Species	Habitat acres	Acres of habitat	Little habitat remaining after 2014 fires except for areas that burned at very low and low severity

Environmental Consequences

Threatened and Endangered

Northern Spotted Owl

Alternative 1

Direct Effects and Indirect Effects

Alternative 1 will not plant any trees or create fuel breaks to protect the project area from future wildfires. Northern spotted owls lost a large part of their habitat in the project area as a result of the 2014 fires. Planting can play an important part in expediting the forest regeneration and development of northern spotted owl critical habitat. Fuels treatments can also aid in reducing the likelihood of additional northern spotted owl habitat burning at high severity.

Risk to Reproduction

Alternative 1 will not directly affect this indicator because there are no treatments to remove or degrade any northern spotted owl habitat. Almost all the activity centers analyzed in this project will continue to accumulate fuels resulting from the burned trees falling over. Regeneration of habitat will likely take more than 100 years to develop into high quality northern spotted owl habitat, and this slow development of habitat will only happen as long as high severity fire doesn't interrupt forest development. The slow habitat development is especially difficult for the 12 or more activity centers that were heavily affected by the 2014 fires; habitat in these activity centers is highly unlikely to provide the needs for reproducing northern spotted owl.

Changes to Critical Habitat

Critical habitat for the northern spotted owl overlaps a large portion of the 2014 fires; a large number of critical habitat acres were burned at high severity. The loss of critical habitat often coincides with the loss of the better habitat for the owl. Alternative 1 will not affect northern spotted owl critical habitat. The lack of treatment will retain all the remaining habitat and important legacy structures to aid in the development of owl habitat by providing physical structure as the stand regenerates. Since northern spotted owls and their prey rely on these structures to fulfill their needs for survival and reproduction, the maintenance of large trees and large woody debris will increase the quality of future owl habitat.

Cumulative Effects

Risk to Reproduction

Many of the on-going and future actions (as summarized in appendix C) remove or downgrade habitat. The removal or downgrading of habitat is not enough, however, to shift the level of risk for any of the activity centers in the analysis area from that described in the affected environment so adding the effects of these actions to the effects of alternative 1 will not measurably affect reproduction.

Changes to Critical Habitat

The result of the cumulative actions for alternative 1 is an effect on about 542 acres of critical habitat in subunit KLE7. The remaining three subunits have no cumulative effects for this analysis indicator from the affected environment so adding the effects of these actions to the effects of alternative 1 will continue the amount of critical habitat on a negative trend (about 2% reduction of critical habitat in the analysis area).

Alternative 2

Direct Effects and Indirect Effects

Risk to Reproduction

All the known activity centers within the analysis area will have some type of treatment in the home range but the level of effects will vary. For analysis indicator 1, three activity centers met the “very low” criteria before treatment and alternative 2 will not affect this activity center’s risk level. However, one activity center moved to a higher risk level from moderate level. The remaining activity centers did not move in risk level.

Changes to Critical Habitat

Alternative 2 will result in the removal of critical habitat within all four NSO critical habitat subunits. The combined roadside hazard and fuels treatment will remove trees that pose a risk to human safety including fire-affected trees and trees not affected by fire. Despite the prescription of only removing trees that meet the hazard criteria, several trees are expected to be removed thus reducing canopy cover and other habitat characteristics in the project area. However, not every acre of roadside hazard treatment contains habitat and not every acre of habitat receiving roadside hazard treatment will result in habitat removal. Therefore, the estimate of effects to northern spotted owl critical habitat is likely an overestimate because it is assumed that roadside treatment will downgrade or remove critical habitat occurring within the treatment.

Cumulative Effects

Risk to Reproduction

The direct and indirect effects of alternative 2 plus the effects resulting from other actions within the analysis area do not change the risk level for any of the activity centers. The risk level does not change due to the other actions, not because the actions do not have an effect but because most of the activity centers with other actions are already at the highest level of risk for this analysis. These activity centers will continue to have a high risk to reproduction and reproduction is not likely to occur in these activity centers so the cumulative effects of adding the effects of alternative 2 to the effects of other actions will not have a substantial effect on reproduction.

Changes to Critical Habitat

For this analysis indicator, the cumulative effects of adding the effects of alternative 2 to those of other past, present and reasonably foreseeable future actions will result in additional acres of critical habitat being removed. The direct and indirect effect of this alternative (about 1,205 acres of nesting/roosting, foraging, and dispersal) plus the effect of actions from other projects (about 553 acres of nesting/roosting, foraging, and dispersal) will remove about 1,758 acres of critical habitat (nesting/roosting, foraging, and dispersal) totaling about 2% of the nesting/roosting, foraging, and dispersal for the portion of critical habitat in the analysis area (table 3-9).

Table 3-9: Change in Critical Habitat Acres for Alternative 2

Critical Habitat Subunit	Critical Habitat area in Analysis Area	Change in NSO Critical Habitat from Current Condition		
		Nesting/roosting (ac)*	Foraging (ac)*	Dispersal (ac)*
KLE6	3,362	-5	0	-3
KLE7	36,408	-45 (-125)	-120 (-283)	-39 (-339)
KLW7	21,978	-84	-245	-196
KLW8	22,715	-322	-67 (-77)	-79
Total	84,463	Loss of 456 (-536)	Loss of 432 (-605)	Loss of 317 (-617)

* The acres presented in the parentheses are the acres removed by the alternative and cumulative effects combined

Alternative 3

Direct Effects and Indirect Effects

Risk to Reproduction

Alternative 3 will not treat several small salvage units scattered in the project area, including the Beaver Fire-based area. These units are small enough for NSO to likely fly across unlike large openings which increase the risk of predation. Even though the lack of treatment in these small salvage units reduces the number of habitat acres being affected by this alternative, the risk to reproduction is the same as alternative 2. Although each activity center is important for northern spotted owl recovery, the “very low” and “low” ranked activity centers are most likely to have reproduction and contribute to the population.

Changes to Critical Habitat

The effects of alternative 3 on critical habitat are the same as alternative 2.

Cumulative Effects

Risk to Reproduction

The direct and indirect effects of alternative 3 plus cumulative effects resulting from other actions within the analysis area will not change the risk level for any of the activity centers.

Changes to Critical Habitat

The direct and indirect effects of alternative 3 plus cumulative effects resulting from other actions within the analysis area will be the same as for alternative 2.

Alternative 4

Direct Effects and Indirect Effects

Risk to Reproduction

For this analysis indicator, the resulting level of risk to reproduction is the same as for alternative 2 but there are differences in acres of habitat affected.

Changes to Critical Habitat

The effects of alternative 4 on critical habitat are similar to alternative 2 except fewer acres of critical habitat will be removed. The potential effect on current and future critical habitat is very similar to alternative 2. There is a loss of 1,195 acres of nesting/roosting, 2,642 acres of foraging and 2,781 acres of dispersal.

Cumulative Effects

Risk to Reproduction

The direct and indirect effects of alternative 4 plus effects resulting from other actions within the analysis area resulted in cumulative effects similar to those described for alternative 2.

Changes to Critical Habitat

The effects of alternative 4 on critical habitat are similar to alternative 2 except fewer acres of critical habitat will be affected. The direct and indirect effect of this alternative (about 1,179 acres of nesting, roosting, foraging, dispersal (NRFD) habitat) plus the cumulative effect (about 553 acres of NRFD) from other projects will remove about 1,732 acres of critical habitat (NRFD) totaling about 2% of the NRFD for the portion of critical habitat in the analysis area.

Alternative 5

Direct Effects and Indirect Effects

Risk to Reproduction

Alternative 5 has the least amount of area affected among the action alternatives. However, the risk to reproduction level for each activity center is the same as alternative 2.

Changes to Critical Habitat

The effect on critical habitat is the same as alternative 2.

Cumulative Effects

Risk to Reproduction

The direct and indirect effects of alternative 5 plus effects resulting from other actions within the analysis area wouldn’t result in any shift in risk level from those presented in alternative 2. The cumulative effects of alternative 5 for risk to reproduction is the same as alternative 2.

Changes to Critical Habitat

The cumulative effects on critical habitat are the same as in alternative 2.

Forest Sensitive

Bald Eagle

Alternative 1

Direct Effects and Indirect Effects

Level of Disturbance to Roost/Nest Sites

The bald eagle nests within the project area will likely continue to provide nesting opportunity without treatment. The lack of treatment will have no effect on disturbing nesting eagles in the short- or long-term.

Risk to Future Potential Nest Trees

The current nesting trees will likely continue to stand and other possible nesting trees are available near the current nest site; thus, this alternative will result in no effect on future possible nest trees. In the long-term, the nest trees may still be standing and other possible nest trees will be available.

Cumulative Effects

There are no direct or indirect effects resulting from alternative 1, thus no cumulative effects.

Alternative 2

Direct Effects and Indirect Effects

Level of Disturbance to Roost/Nest Sites

Alternative 2 will have treatment within 0.5 miles for all four bald eagle nest sites. However, only one nest site is within 1,500 feet of noise created by the proposed activities. The Caroline Creek eagle nest has salvage and roadside hazard treatment within 600 feet of the nest. In terms of this analysis indicator, the Caroline Creek nest site has a high risk of eagles abandoning the nest, if it is an active nest and noise is created during the nesting period. In order to mitigate this concern, a project design feature (in table 2-1 of chapter 2) will be used to avoid noise disturbance for all four nest sites by keeping noise producing activities far enough from the nest to avoid disturbance and/or avoid operating equipment during the nesting period. Therefore, the project design feature will minimize the risk of creating noise that may result in noise disturbance. Using the project design feature, the Caroline Creek nest level of disturbance would be low.

Risk to Future Potential Nest Trees

This analysis indicator examines the risk to future bald eagle nest sites. Ideally, eagles will have a large selection of large trees to select from in the near area of the active nest site in case a new nest tree is needed. Three of the four eagle nests have a small amount of treatment (less than four acres) that will remove potential future nest trees within the near area (defined in spatial bounds as the analysis area). However, the Caroline Creek eagle nest will have a large proportion of potential future nest trees removed from the nearby area. According to this analysis indicator, Donna, Muck-A-Muck, and Frying-pan eagle nests will have a low risk of affecting the future nest tree availability because of the small amount of treatment near them. Caroline Creek nest, however, will have a high risk of the eagle pair not finding a nest tree in the future if the eagles choose to move.

Cumulative Effects

Level of Disturbance to Roost/Nest Sites

The four nest site analysis areas contain planned activities from the Happy Camp Fire Protection, Thom Seider, and McCollins projects on the Forest; on private land, actions include one timber harvest plan (#87), and the Grider Creek non-industrial timber management plan. A project design feature will minimize disturbance of the eagle nest by limiting the time period any activity can occur on the Forest (outside the nesting period) or the planned activities are far enough from the nest to avoid disturbance. Therefore, the cumulative effect for this analysis indicator results in no disturbance effects from alternative 2 plus no additional effects of disturbance from ongoing or future projects because effects are minimized or the projects are so far away from the nests that no disturbance will occur.

Risk to Future Potential Nest Trees

The current or future activities within the analysis area total about 490 acres in this alternative but only about ten acres of treatment are expected to result in the loss of large trees that may provide future nest trees. Therefore, the acres affected and resulting risk assessment for the Muck-A-Muck, Caroline, and Frying-pan nests will remain the same as presented above and the Donna eagle nest will have three acres affected by alternative 2. Adding these three acres to the ten acres affected by other projects results in 13 acres cumulatively affected. The Donna eagle nest will remain at a low risk to future potential nest trees.

Alternative 3

Direct Effects and Indirect Effects

Level of Disturbance to Roost/Nest Sites

The effects for this analysis indicator in this alternative are the same as described for alternative 2. The project design feature will reduce the potential of disturbing nesting eagles, thus the risk of disturbance is low for alternative 3.

Risk to Future Potential Nest Trees

Like alternative 2, alternative 3 will have a low risk on future nesting trees for Donna, Muck-A-Muck, and Frying-pan nest sites. In this alternative, the Caroline Creek eagle nest has fewer acres of potential nesting trees affected than in alternative 2 but the risk is still elevated according to the analysis indicator criteria because of the number of salvage acres near the nest. A project design feature will be used to minimize negative effects to potential nest trees by retaining additional large snags in Caroline Creek Bald Eagle Management Area and extending the distance between the nest and salvage treatment. Even though the project design feature will not remove all the risk, the retention of additional large snags will lessen the risk to a moderate level.

Cumulative Effects

Level of Disturbance to Roost/Nest Sites

The cumulative effects are the same for alternative 3 as in alternative 2 for the level of disturbance to roost and nest sites.

Risk to Future Potential Nest Trees

The cumulative risk to future potential nest trees will be the same as for alternative 2 except that Caroline Creek nest will have a reduced level of effects on potential future nest trees.

Alternative 4 and 5

Direct Effects and Indirect Effects

Level of Disturbance to Roost/Nest Sites

Potential disturbance for all four nest sites is low for these alternatives.

Risk to Future Potential Nest Trees

The risk to future nest trees is low for all four nest sites.

Cumulative Effects

Level of Disturbance to Roost/Nest Sites

The cumulative effects are the same for alternatives 4 and 5 as for alternative 2

Risk to Future Potential Nest Trees

The cumulative effects are the same for alternatives 4 and 5 as in alternative 2 except that the Caroline Creek nest will have a reduced level of effects on potential future nest trees.

Northern Goshawk

Alternative 1

Direct Effects and Indirect Effects

Level of Disturbance to Nest Sites

Alternative 1 will not disturb any of the goshawk nests. Any active nests in the project will not be disturbed by heavy equipment or increased road activity. In the long-term, the lack of disturbance is expected to continue without action.

Risk to Reproduction

The eleven goshawk nests that may be affected by this project have been affected by the fire which has resulted in most of the nests having a small amount of habitat. Only one nest (Sixmile) has sufficient habitat left after the 2014 fires to consider any effect to reproduction; there will be no effects from this alternative. Without treatment, the remaining ten nests have moderate or high risk levels and will continue to struggle to support reproduction; for the high risk nests, reproduction is not likely. Over the long-term, the highly fire-affected habitat will remain in poor condition and will not provide habitat for reproduction for the northern goshawk.

Cumulative Effects

Level of Disturbance to Nest Sites

There are no direct or indirect effects resulting from alternative 1, thus no cumulative effects.

Risk to Reproduction

There are no direct or indirect effects resulting from alternative 1, thus no cumulative effects.

Alternative 2, 3, 4 and 5

Direct Effects and Indirect Effects

Alternatives 2, 3, 4 and 5 have the same effects on Goshawks, so they are discussed together.

Level of Disturbance to Nest Sites

Alternatives 2, 3, 4, and 5 will have treatment within 0.25 miles of six goshawk nest sites (Kohl, Beaver, China, Elk, Middle, and Hickory). However, a project design feature will be used to avoid disturbance of these nests through the sensitive period of nesting. Therefore, alternatives 2, 3, 4, and 5 will have a low risk of disturbing known goshawk nests.

Risk to Reproduction

Ten of the 11 known goshawk nests (the area around the Woodchopper nest contains no activities) in the project area contain proposed activities that will remove dead or dying trees within areas considered to no longer be habitat; some of the treatment units contain fire-damaged trees that still provide canopy cover and meet the description of goshawk habitat.

Alternatives 2, 3, 4, and 5 will remove habitat and result in two nests (Hickory and West Whites) increasing in the level of risk to reproduction from moderate to high. Both of these nests have abundant habitat in the primary nest zone (0.5 mile radius of the nest) but the foraging zone (outside the primary nest zone 0.5 to 1.0 mile) doesn't contain a large amount of habitat and is, consequently, near the moderate risk category minimum for foraging area habitat acres. Therefore, the treatment in these alternatives, although small in the number of acres of habitat removed, will result in the Hickory and West Whites goshawk nests having a high level of risk to reproduction.

Cumulative Effects

Level of Disturbance to Nest Sites

A project design feature will lower the likelihood that noise generated by the project will disturb known goshawk nests for alternatives 2, 3, 4, and 5. However, one nest located on the Forest has private property within 0.25 miles of the nest location. The private owner is implementing a project that may or may not provide a limited operating period for this nest, thus possibly creating noise that may disturb a nesting goshawk if one is present. This nest is not likely to be active, given the substantial amount of habitat lost to a 2014 fire. Almost the entire primary nest core and a large portion of the foraging zone burned at high severity, thus creating conditions unfavorable for a nesting goshawk. Adding the effects of the action alternatives to the effects of other projects including those on private land is not likely to result in measurable cumulative effects to the level of disturbance to known nest sites.

Risk to Reproduction

Only two nests (Beaver and Kelsey) change in the level of risk to reproduction as a result of the effects of action alternatives added to the effects of other projects including those on private land. The Beaver nest is located among several parcels of private land and the anticipated amount of treatment is expected to move this nest from a moderate level to a high level of risk to reproduction. The Kelsey nest was affected by the fire; the addition of effects of treatment in the Lovers Canyon project to the effects of treatment in the action alternatives will result in the risk to reproduction moving from moderate to high. The remaining seven nests have cumulative effects but the effects are not large enough to change the level of risk to reproduction. There are measurable cumulative effects to the Beaver and Kelsey nests.

Fisher, Marten and Wolverine

Alternative 1

Direct Effects and Indirect Effects

Connectivity of Habitat

The 2014 fires removed a large portion of the habitat for these species (habitat associated with older forests with dense canopy cover), thus reducing the number of home ranges for these species. The loss of habitat is likely to continue if another wildfire begins, thus continuing to set back the development of forested habitat. The high-severity burned forest is not likely to provide much habitat for use by these species since most of the vegetation cover has been removed. The connectivity in the watersheds is likely to decline from current condition as this occurs (see the affected environment section). A lack of overhead cover resulting from the 2014 fires is likely to obstruct the movements of fisher and marten but, as the snags start to fall over along with shrub growth, the area may provide enough physical structure for fisher and marten to move across these openings. The loss of cover will affect marten and fisher much more than wolverine.

Change in Home Range

Although tall shrubs and woody debris may provide structure for fisher and marten to move across openings, one of the most important factors for fisher and marten home ranges is sufficient denning/resting habitat. Denning/resting habitat affected by the 2014 fires will take many years to regenerate; any additional assistance to accelerate the regeneration process is likely to help. In the short-term, protection of existing denning/resting habitat from future high severity fire is important to conserve viable home ranges. Alternative 1 will not help to accelerate regeneration or protect existing habitat. Fuels created by the 2014 fires will continue to accumulate and will create conditions that increase the likelihood of future high severity fire (see the fire and fuels resource report for more detailed information). This accumulation of fuels will threaten denning/resting habitat and increase fragmentation of home ranges. Alternative 1 will not affect the habitat connectivity for these species or the amount of habitat needed for a fisher home range.

Cumulative Effects

Connectivity of Habitat

As a result of adding the effects of actions considered for cumulative effects to the effects of alternative 1, one watershed (Dutch Creek) will not have enough habitat to provide connectivity for fisher, marten, and wolverine. The remaining watersheds will continue on the trajectory of connectivity described above. Cumulatively, there will be 30 watersheds with moderate connectivity, 15 with a low connectivity and 22 with a very low connectivity.

Change in Home Range

When added to the current condition of the watersheds and the effects of alternative 1, the effects of other projects will result in one additional watershed (Big Ferry-Swanson) not providing enough habitat to support a fisher home range; instead of 25 watersheds able to support a home range, there will be 24.

Alternative 2

Direct Effects and Indirect Effects

Connectivity of Habitat

Alternative 2 will affect habitat connectivity in13 watersheds. There are seven watersheds that will go from moderate habitat connectivity to low or very low connectivity in this alternative; the remaining six watersheds will drop from low to very low habitat connectivity. All other watersheds remain at the same level of connectivity as currently provided.

Change in Home Range

Three (Cougar Creek-Elk Creek, Lower West Fork Beaver Creek, and Tom Martin Creek-Klamath River) of the 25 watersheds that meet the criteria of possibly containing or contributing to a fisher home range fall below the fisher home range threshold in alternative 2. These three watersheds are not likely to contain a fisher home range after treatments are completed.

Cumulative Effects

Connectivity of Habitat

Adding the direct and indirect effects of this alternative to the effects of other actions will cumulatively result in one watershed changing in the level of habitat connectivity. Dutch Creek has a low level of connectivity in this alternative and the addition of the effects of other actions will result in very low connectivity.

Change in Home Range

Adding the direct and indirect effects of this alternative to the effects of other actions will result cumulatively in one watershed falling below the level of habitat needed for a fisher home range. The Big Ferry – Swanson watershed is affected by the Singleton project and projects on private land that will result in the loss of habitat and home range potential in the watershed; adding these effects to those of alternative 2 will result in measurable cumulative effects.

Alternative 3

Direct Effects and Indirect Effects

Connectivity of Habitat and Change in Home Range

The effects of alternative 3 on habitat connectivity are the same as for alternative 2 except Horse Creek and Doggett Creek will remain at the same level of habitat connectivity as the current condition. Therefore, effects of alternative 3 are lower than alternative 2.

Change in Home Range

The effect of alternative 3 on home ranges is the same as for alternative 2.

Cumulative Effects

Connectivity of Habitat and Change in Home Range

The cumulative effects are the same as for alternative 2.

Alternative 4

Direct Effects and Indirect Effects

Connectivity of Habitat

The effects of alternative 3 on habitat connectivity are the same as for alternative 2 except Horse Creek and Doggett Creek will remain at the same level of habitat connectivity as in the current condition. Therefore, effects of alternative 3 are less than alternative 2.

Change in Home Range

The effects on home ranges are the same as for alternative 2.

Cumulative Effects

Connectivity of Habitat and Change in Home Range

The cumulative effects are the same as for alternative 2.

Alternative 5

Direct Effects and Indirect Effects

Connectivity of Habitat

Alternative 5 had the smallest effects to habitat connectivity among the action alternatives. Six watersheds maintained the current condition level of habitat connectivity and four of those watersheds maintained a moderate level of habitat connectivity. The moderate level of connectivity is the highest level of connectivity existing in the project area, thus this alternative best maintains connectivity in these watersheds.

Change in Home Range

The effect of alternative 3 on home ranges is the same as for alternative 2.

Cumulative Effects

Connectivity of Habitat and Change in Home Range

The cumulative effects are the same as for alternative 2.

Pallid Bat, Townsend's Big-eared Bat, Fringed Myotis

Alternative 1

Direct Effects and Indirect Effects

Risk of Disturbance to Roost Sites

Any roost sites that retained the micro-climate condition necessary to support a hibernaculum or maternity colony will continue to provide those services. For alternative 1, the lack of action will not affect bats. The rate of forest regeneration will be slow without treatment but bats will be able to continue to use the abundant source of snags. The lack of disturbance created by treatment will maintain any hibernacula or maternity sites. Therefore, for this analysis indicator, there is no effect on disturbance to bats.

Cumulative Effects

There are no direct or indirect effects resulting from alternative 1, thus no cumulative effects.

Alternative 2, 3, 4 and 5

The effects of alternatives 2, 3, 4 and 5 on risk of disturbance to roost sites are the same.

Direct Effects and Indirect Effects

Risk of Disturbance to Roost Sites

All the action alternatives have similar direct and indirect effects for this analysis indicator. About 75% of the areas with potential hibernacula (or maternity sites) will have a low or moderate risk of disturbing a possible bat maternity site or hibernaculum. Given the time period when treatment is most likely to occur (summer and fall months), treatment is not likely to disturb a possible hibernaculum. The treatments may disturb a maternity site because maternity roosts are active from about April to August, but are most sensitive during the early spring when the offspring are not capable of flight. Although unlikely, the 15 areas with potential hibernacula with moderate risk of disturbance could affect a maternity roost; more realistically, treatments more than 250 feet away are only likely to disrupt foraging bats. Therefore, the sites with potential cave or cave-like structures in the 13 areas with potential hibernacula with a high risk of disturbance are likely the most vulnerable to abandonment; this could affect a population. Maternity roosts are not common because bats need specific cave-environment conditions; although there are several possible caves or cave-like structures in the project area, very few meet the criteria.

Cumulative Effects

Risk of Disturbance to Roost Sites

The direct and indirect effects for each of the alternatives plus the effects of other actions will result cumulatively in about doubling the number of areas with potential hibernacula that have a high risk of disturbing bats. The majority of this effect is because of the uncertainty of mitigations occurring on private land. Therefore, the cumulative effects may be an overestimate, especially if private lands are implementing mitigation to minimize the negative effects on roost sites.

Willow Flycatcher

Alternative 1

Direct Effects and Indirect Effects

Level of Habitat Disturbance

Willow flycatchers are dependent on live riparian vegetation; the loss of this vegetation is likely to affect the number of possible areas for nesting. Alternative 1 will not change the current condition of the habitat. The remaining areas of habitat will continue to provide nesting opportunity to flycatchers. Burned forest is not likely to be beneficial to flycatchers so the retention of these snags will not affect this species. In the long-term, the habitat will regenerate and possibly produce willow or alder patches for flycatchers. For this analysis indicator, the lack of action will have no effect on habitat alteration from the current condition.

Cumulative Effects

Level of Habitat Disturbance

There are no direct or indirect effects resulting from alternative 1, thus no cumulative effects.

Alternative 2, 3, 4 and 5

The effects of alternatives 2, 3, 4 and 5 on the level of habitat disturbance are the same.

Direct Effects and Indirect Effects

Level of Habitat Disturbance

The direct and indirect effects on willow flycatcher habitat is low for most (70%) of the 7th field watersheds in the analysis area. Most of the effects are as a result of fuels treatments in the riparian reserves and site preparation outside of plantations. These treatments have almost the same footprint for watersheds identified as having “low” and “moderate” levels of habitat alteration but, in alternative 5, there are additional treatments that will possibly affect riparian habitat; the watersheds where these additional treatments will occur have a “high” level of habitat alteration despite the implementation of any action alternative. Therefore, the number of watersheds within each of the levels of habitat alteration will not change between the action alternatives.

Cumulative Effects

Level of Habitat Disturbance

The direct and indirect effects for each of the alternatives plus the effects of other actions will result cumulatively in four watersheds shifting from a low to a high level of habitat alteration. The effects for these four watersheds may be an overestimate because most of the cumulative effects are occurring on private lands and these areas may be managed differently from the Forest. Therefore, any mitigation on private land would lessen the cumulative effects.

Siskiyou Mountains Salamander

Alternative 1

Direct Effects and Indirect Effects

Risk of Habitat Disturbance

Alternative 1 will not change the existing cool, moist talus habitat typically created by dense conifer canopy on northerly slopes needed by Siskiyou Mountain salamander. Habitat burned by the 2014 fires at moderate to high severity is likely to have little to no canopy cover; the small amount of canopy cover left after the fires will be retained in this alternative. In addition, the small spaces between pieces of talus needed by the salamander to move deeper or shallower in the talus profile to reach desired temperature and moisture will not be disturbed by activities that may compact the talus. For this analysis indicator, there is no effect on risk of habitat disturbance.

Cumulative Effects

There are no direct or indirect effects resulting from alternative 1, thus there are no cumulative effects.

Alternative 2, 3, 4 and 5

The effects of alternatives 2, 3, 4 and 5 on level of habitat disturbance are the same.

Direct Effects and Indirect Effects

Risk of Habitat Disturbance

All the action alternatives have a similar level of effects on salamander habitat disturbance but different activities have different effects. Ground-based equipment is the most likely to compact salamander habitat followed by skyline yarding corridors where several logs are basically dragged over the same ground. Skyline yarding overall is likely to affect fewer acres of talus habitat create fewer compacted areas than logging that uses ground-based equipment such as tractors. There are 19 known salamander sites in treatment units that are expected to create ground disturbance. In order to minimize impacts to these known sites, a project design feature will minimize compaction by buffering known sites and maintaining live or dead trees within the buffer. Therefore, with implementation of the project design feature, the level of risk for disturbing known sites is low.

Cumulative Effects

Risk of Habitat Disturbance

The direct and indirect effects for each of the alternatives plus the effects of actions on private land that may affect talus habitat will result in four known sites potentially being cumulatively affected. The level of risk of disturbing a known site is cumulatively low and the cumulative effects may be overestimated if mitigations to reduce effects are used on private land projects.

Tehama Chaparral Snail

Alternative 1

Direct Effects and Indirect Effects

Likelihood of Dispersal

Alternative 1 will not affect any talus in conifer and hardwood mixed habitat near riparian reserves in project area. There are likely to be some patches of habitat where canopy cover and micro-site conditions will provide for the needs of several individuals remaining after the 2014 fires. The pre-fire woody debris which is likely to be supplemented by the post-fire abundant dead trees will provide small areas of possible refugia for dispersing snails. The lack of habitat disturbance will allow remaining habitat to provide future habitat when canopy cover regenerates. For this analysis indicator, there is no effect on snails dispersing.

Cumulative Effects

Likelihood of Dispersal

There are no direct or indirect effects resulting from alternative 1, thus no cumulative effects.

Alternative 2, 3, 4 and 5

The effects of alternatives 2, 3, 4 and 5 are the same for likelihood of dispersal.

Direct Effects and Indirect Effects

Likelihood of Dispersal

All action alternatives have similar effects on Tehama chaparral snail dispersal habitat which consists of some type of physical structure to provide cooler and moisture conditions during dispersal. Providing this structure is most important for snails that are dispersing across areas without canopy cover. Project design features provide varying sizes of woody debris of trees equal to or greater than12 inches in diameter after fuels treatments so that treatment units have sufficient woody debris. In addition, project design features will retain live and dead trees in the treatment units to provide future woody debris, and the known sites of Tehama chaparral snails will not be treated so that remaining habitat will be retained. Therefore, given the project design features, the likelihood of dispersal will be a high for alternative 2, 3, 4, and 5.

Cumulative Effects

Likelihood of Dispersal

There are no other actions that will affect snail dispersal because no known sites in the project area overlap with any other project. Therefore, there will be no cumulative effects to snail dispersal.

Western Bumble Bee

Alternative 1

Direct Effects and Indirect Effects

Level of Habitat Disturbance

Alternative 1 will not affect bumble bee habitat, most of which is in meadows that provide nesting and foraging opportunity for bees. According the vegetation burn severity data, most of the 4,000 acres of meadows in the project area burned at low severity in the 2014 fires; therefore, it is likely that many of the meadows still contain vegetation which can provide basic structure for a bumble bee nest site and will produce flowering plants this spring. Retaining snags outside meadows will not affect the ability of bumble bees to survive or reproduce. For this analysis indicator, there is no effect on bumble bee nest disturbance.

Cumulative Effects

Level of Habitat Disturbance

There are no direct or indirect effects resulting from alternative 1, thus no cumulative effects.

Alternative 2, 3, 4 and 5

The effects on level of habitat disturbance is the same for alternatives 2, 3, 4 and 5

Direct Effects and Indirect Effects

Level of Habitat Disturbance

All action alternatives have similar effects on the level of disturbance to habitat for the western bumble bee. Treatments are not likely to occur in wet meadows but there are several meadows that may not be wet that may be treated. In order to capture the potential effects of each alternative, it is assumed that any meadow occurring in the treatment unit may be disturbed by implementation of the project. Given this situation, there are five 7^{th} field watersheds with possible disturbance occurring at a high level. In addition, there are five watersheds where a moderate level of disturbance may be created. Project design features will minimize negative effects to bumble bee habitat by limiting treatments within meadows.

Cumulative Effects

Level of Habitat Disturbance

The direct and indirect effects for each of the alternative plus the effects of other actions will cumulatively result in three watersheds going from a low level of disturbance to a moderate level.

Management Indicator Species

Snag Associated Species

Alternative 1

Direct Effects and Indirect Effects

In this alternative, there will be no removal of trees, road construction, or any other activities associated with the project. Potential negative effects of no action would be high fuel loads and risk of future high severity fire adjacent to remaining habitat or within regenerating habitat. Positive effects would include the total retention of snags which are important habitat features within remaining late seral closed canopy coniferous habitat.

Snag-associated species would have abundant source and variety of snags. Black-backed woodpeckers, if present, would have the maximum available habitat produced by the high intensity fire. Other snag-associated species like the Vaux’s swift and downy woodpecker would have a possible increase in more open stands of snags or creation of new snag habitat. Secondary cavity nesters, however, may have a reduction in older, decaying snags with cavities as those tend to burn up in the fires but, in the long-term, these species will likely have an abundant source of previously excavated snags.

Cumulative Effects

Other projects in the analysis area are expected to affect habitat to the point that it may not function as snag-associated habitat. Overall, about 1,692 acres of the 105,410 acres of snag habitat in the analysis area will be affected by actions considered for cumulative effects (appendix C). These acres represent the footprint of habitat for snag-associated species because habitat for some species overlaps. Affected acres represent about 2% of the habitat within the analysis area.

Alternative 2

Direct Effects and Indirect Effects

The percent of snag-associated species habitat affected by alternative 2 varies between individual species but about 12% of snag-associated species habitat will be affected by roadside hazard and salvage treatments. The other treatments in this alternative are likely to have minor effects on snag-associated species habitat. With implementation of project design features, salvage treatment units will not provide five snags on every acre but the project will meet the Forest Plan standard of five snags per acre averaged over 100 acres. Therefore, alternative 2 is likely to provide a sufficient number of snags of varying decay classes to provide a habitat level of “good” snag-associated habitat.

Cumulative Effects

The direct and indirect effects (about 11,652 acres) of alternative 2 plus effects resulting from other projects within the analysis area cumulatively result in about 1,726 additional acres of snag habitat being affected. These effects total about 13,378 acres or about 13% of the estimated snag-associated species habitat within the project area. Most of the effects of other actions occur on private lands (1,692 acres); snag retention on these lands is likely to be incidental. Since the Forest project that accounts for the additional 34 acres of the cumulative effects must meet the same Forest Plan standards and guidelines as this project, these 34 acres will meet the “good” level of snag habitat. Therefore, the cumulative effects of alternative 2 will result in 11,693 acres of snag habitat being degraded and 1,692 acres will be removed (not provide snag habitat after treatment).

Alternative 3 and 4

The effects to snag habitat are the same for alternatives 3 and 4.

Direct Effects and Indirect Effects

Alternatives 3 and 4 have similar level of effects on habitat as alternative 2, but these alternatives are proposing a reduced level of salvage treatment. Alternative 3 (about 11,468 acres or about 11% of the total snag habitat) and alternative 4 (about 11,352 acres or about 11% of the total snag habitat) have similar numbers of acres of snag habitat affected in the project area by proposed salvage and roadside hazard treatments. Given that these alternatives are using the same minimum snag retention (alternative 3 will have additional snag retention beyond alternative 2) as alternative 2, the effects are going to be similar, but alternative 3 and 4 will have less acres degraded. Therefore, alternatives 3 and 4 are likely to provide a sufficient number of snags of varying decay classes thus providing a habitat level of “good” snag associated habitat.

Cumulative Effects

The direct and indirect effects of alternative 3 (about 11,468 acres) and alternative 4 (about 11,352 acres) plus the effects resulting from other projects within the analysis area result in about 1,692 additional acres of snag habitat being affected for alternative 3 and alternative 4. Therefore, the cumulative effects will result in 11,468 acres (alternative 3) and 11,352 (alternative 4) of snag habitat being degraded and 1,692 acres will be removed (not provide snag habitat after treatment).

Alternative 5

Direct Effects and Indirect Effects

Alternative 5 will affect about 8,225 acres or about 8% of the total snag habitat in the project area by proposed salvage and roadside hazard treatments. Given that these alternatives are using the same minimum snag retention as alternative 2, the effects are going to be similar, but alternative 5 will have fewer acres degraded. Therefore, alternatives 5 is likely to provide a sufficient number of snags of varying decay classes thus providing a habitat level of “good” snag associated habitat.

Cumulative Effects

The cumulative effects of alternative 5 are 8,225 acres of snag habitat will be degraded and 1,692 acres will be removed (not provide snag habitat after treatment).

Hardwood Associated Species

Alternative 1

Direct Effects and Indirect Effects

Alternative 1 does not have any direct effects on hardwood-associated species. Hardwood stands burned with moderate or high severity effects in the 2014 fires are not likely to meet the needs of these species because they are completely or partly dependent on hardwood mast as a food source. Without a food source, the species are likely to leave this fire-affected habitat to occupy areas with live trees. In the long-term, some of the hardwoods will re-sprout and provide future habitat for these species assuming wildfire doesn’t return in the near future. An indirect effect of alternative 1 comes from the large fuel loads within or adjacent to the hardwood stands that are likely to contribute to another wildfire occurring that will prevent these stands from developing into a hardwood forest.

Cumulative Effects

For hardwood associated species, the effects of other actions in the analysis area will result in removing about 6% (590 acres) of the habitat in the project area. Therefore, the cumulative effects of adding the non-quantified indirect effects of this alternative to the 590 acres of hardwood habitat that will be removed in other actions will result in less habitat available in the future for hardwood-associated species.

Alternative 2

Direct Effects and Indirect Effects

Alternative 2 may affect about 728 acres of hardwood habitat that exists in the roadside hazard and salvage treatment units. It isn’t likely that all hardwood trees within roadside hazard treatment units will be removed because not all hardwoods along roadsides fit the definition of hazard trees (see chapter 2 and referenced document for more detailed information). However, since it is difficult to estimate the number of hardwoods that might be retained in the hazard tree treatment units, it is assumed that all the hardwood trees will be removed for this analysis. The salvage treatment is focused on removing conifer trees and there is no intention to remove any hardwoods but, for various reasons related to safety and implementation potential, the hardwoods may be damaged. About 7% of the current oak habitat will be removed by alternative 2.

Cumulative Effects

The direct and indirect effects (728 acres) of alternative 2 plus effects resulting from other projects within the analysis area (about 590 acres of additional acres of hardwood habitat being affected) cumulatively total about 1,318 acres or about 13% of the estimated hardwood habitat within the project area. The hardwood habitat on private land is assumed to be removed. Therefore, the cumulative effect will be 1,318 acres of hardwood habitat being removed (not function as habitat in the near future).

Alternative 3 and 4

The effects to hardwood-associated habitat are the same for alternatives 3 and 4.

Direct Effects and Indirect Effects

Alternatives 3 and 4 will result in removing 717 acres and 679 acres of hardwood habitat respectively. Like alternative 2, estimates of effects of alternatives 3 and 4 are likely overestimated because roadside hazard treatments are likely to retain most of the hardwoods and the hardwoods in the salvage units may be damaged but are likely to remain in the units after treatment.

Cumulative Effects

The direct and indirect effects (717 acres) for alternative 3 and alternative 4 (679 acres) plus effects resulting from other projects within the analysis area (about 590 acres of additional acres of hardwood habitat being affected) cumulatively result in about 1,307 acres being removed for alternative 3 and about 1,279 acres being removed for alternative 4. Alternatives 3 and 4 each account for about 13% of the estimated hardwood habitat within the project area. The hardwood habitat on private land is assumed to be removed. Therefore, the cumulative effects will result in 1,307 acres for alternative 3 and 1,279 acres for alternative 4 of hardwood habitat being removed (not function as habitat in the near future).

Alternative 5

Direct Effects and Indirect Effects

Alternative 5 will result in removing 66 acres of hardwood habitat. Like alternative 2, effects of alternative 5 are likely overestimated because the roadside hazard treatment is likely to retain most of the hardwoods and the hardwoods in the salvage units may be damaged but are likely to remain in the unit after treatment.

Cumulative Effects

The direct and indirect effects for alternative 5 (66 acres) plus effects resulting from other projects within the analysis area (about 590 acres of additional acres of hardwood habitat being affected) cumulatively result in about 656 acres or about 7% of the estimated hardwood habitat being removed within the project area. The hardwood habitat on private land is assumed to be removed. Therefore, the cumulative effects will result in 656 acres of hardwood habitat being removed (not function as habitat in the near future).

Survey and Manage Species

Alternative 1

Direct Effects and Indirect Effects

Alternative 1 will not have any direct effects on survey and manage species. The lack of treatment will not affect important habitat components such as current canopy cover, coarse woody debris, or leaf litter/duff. In the short term, the snags and limited down wood in high fire severity affected habitat will continue to provide hot, dry conditions for these species. In the moderate fire severity affected habitat, the small amount of canopy cover will likely decrease in the short-term with delayed tree mortality, thus creating even hotter and drier conditions that may be similar to the high severity fire affected habitat.

In the long term, the abundant source of snags will provide a source of woody debris (an important habitat component for the species, especially for the blue-gray tail dropper) for many years. Large woody debris in conjunction with regenerating trees may provide micro-site conditions for these species in the long term (20 years) but the regeneration of habitat will take much more time (beyond the long-term time span for this analysis).

Cumulative Effects

The only cumulative actions within the analysis bounds are Forest projects. These projects all have project design features to avoid effects to known sites for survey and manage species so there are no cumulative effects from alternative 1 to known sites.

Alternative 2, 3, 4 and 5

The effects to known sites are the same for alternatives 2, 3, 4 and 5.

Direct Effects and Indirect Effects

There are known sites in treatment units for action alternatives but, to avoid potential negative effects, a project design feature including a protection butter will be applied to known sites (see chapter 2). Therefore, the combination of protection buffers for all known sites and surveys of Tehama chaparral snail, Siskiyou Mountain salamander, and blue-gray taildropper habitat occurring in salvage units, road construction, and landings will meet the compliance requirements for survey and manage species.

Cumulative Effects

There are no direct or indirect effects to known sites from alternatives 2, 3, 4 or 5, so there are no cumulative effects.

Migratory Bird Species

Alternative 1

Direct Effects and Indirect Effects

This alternative will have no direct or indirect effect on the compliance with the MOU between the USDA Forest Service and USDI Fish and Wildlife Service. Migratory birds affected by the 2014 fires will continue to be threatened by the possible re-occurring wildfires that may affect unburned habitat. Bird species associated with snags and early seral habitat will have abundant habitat and predicted future wildfires will add to this already abundant habitat.

Cumulative Effects

This alternative will have no direct or indirect effect on complying with the MOU, thus no cumulative effects.

Alternative 2, 3, 4 and 5

Direct Effects and Indirect Effects

Action alternatives for this project will not adversely impact migratory species or their associated habitats. The project will potentially affect up to about 10,200 acres of moderate and high severity forested habitat; this habitat will still provide habitat for many migratory bird species. Potential impacts to migratory species will be minimized through the adherence to Forest Plan standards and guidelines for snags and downed woody debris, riparian reserve buffers, limited ground disturbance, and maintenance of canopy closure. The project is designed to improve habitat conditions through the acceleration of late-successional habitat characteristics by planting trees and removing fuels that threaten the developing and existing habitat. Specific project design features to minimize negative impacts include retaining snags within treatment units which include riparian reserves, and retaining legacy components and snags mixed in with green trees. Any soft (snags existing prior to the fires) snags (greater than14inches in diameter) felled for safety reasons will be left on site as downed woody debris. Additional cull logs will be left on site from the operation as well. Therefore, alternatives 2, 3, 4 and 5 comply with the Migratory Bird Treaty Act MOU.

Cumulative Effects

The effects of treatments on up to 10,200 acres of habitat burned at moderate and high levels of fire severity, added to the effects of other projects in the project area (about 11,450 acres of treatment) will cumulatively result in up to 21,650 acres burned with moderate and high fire severity effects being affected.

Comparison of Effects by Alternative

Table 3-10: Comparison of effects to species and associations by alternative

Species	Indicator	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Northern spotted owl	Risk to reproduction: Direct/indirect Cumulative	Very Low 3 (NC) Low 14 (NC) Mod. 51 (NC) High 12 (NC)	Very Low 3 (NC) Low 14 (NC) Mod. 50 (NC) High 13 (NC)	Same as alternative 2	Same as alternative 2	Same as alternative 2
	Changes to critical habitat: Direct/indirect Cumulative	Number of critical habitat acres affected KLE6 = 0 (NC) KLE7 =0 (542) KLW7 = 0 (NC) KLW8 = 0 (10)	Number of critical habitat acres affected KLE6 = 8 (NC) KLE7 = 204 (747) KLW7 = 525 (535) KLW8 = 468 (478)	Same as alternative 2	Number of critical habitat acres affected KLE6 = 8 (NC) KLE7 = 178 (721) KLW7 = 525 (535) KLW8 = 468 (478)	Same as alternative 2
Bald eagle	Level of disturbance to nest/roost sites: Direct/indirect Cumulative	No direct, indirect, or cumulative effect on noise disturbance	Low level of noise disturbance to nest/roost sites	Low level of noise disturbance to nest/roost sites	Low level of noise disturbance to nest/roost sites	Low level of noise disturbance to nest/roost sites
	Risk to future potential nest areas: Direct/indirect Cumulative	No direct, indirect, or cumulative effects on risk to future potential nest trees.	Number of nests by risk level High = 1 (NC) Mod. = 0 (NC) Low = 3 (NC)	Number of nests by risk level High = 0 (NC) Mod. = 1 (NC) Low = 3 (NC)	Number of nests by risk level High = 0 (NC) Mod. = 0 (NC) Low = 4 (NC)	Same as alternative 4
Northern goshawk	Level of disturbance to nest sites: Direct/indirect Cumulative	No direct, indirect, or cumulative effect on noise disturbance	Number of nests by risk level High = 7 (9) Mod. = 3 (1) Low = 1 (1)	Same as alternative 2	Same as alternative 2	Same as alternative 2

Species	Indicator	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Fisher, Marten, Wolverine	Connectivity of habitat: Direct/indirect Cumulative	Number of watersheds by level of habitat connectivity High = 0 (NC) Mod. = 30 (NC) Low = 16 (NC) Very Low = 21 (NC)	Number of watersheds by level of habitat connectivity High = 0 (NC) Mod. = 23 (NC) Low = 15 (NC) Very Low = 29 (NC)	Number of watersheds by level of habitat connectivity High = 0 (NC) Mod. = 24 (NC) Low = 15 (NC) Very Low = 28 (NC)	Number of watersheds by level of habitat connectivity High = 0 (NC) Mod. = 24 (NC) Low = 14 (NC) Very Low = 29 (NC)	Number of watersheds by level of habitat connectivity High = 0 (NC) Mod. = 27 (NC) Low = 14 (NC) Very Low = 26 (NC)
	Changes in home range: Direct/indirect Cumulative	25 home ranges (24 home ranges)	22 home ranges (21 home ranges)	Same as alternative 2	Same as alternative 2	Same as alternative 2
Pallid Bat, Townsend's Big-eared Bat, Fringed Myotis	Risk of disturbance to roost sites: Direct/indirect Cumulative	No direct, indirect, or cumulative effect on noise disturbance	Number of possible hibernaculum or maternities by risk of disturbance High = 13 (24) Mod. = 15 (12) Low = 30 (22)	Same as alternative 2	Number of possible hibernaculum or maternities by risk of disturbance High = 12 (23) Mod. = 15 (12) Low = 31 (23)	Number of possible hibernaculum or maternities by risk of disturbance High = 13 (24) Mod. = 14 (13) Low = 31 (22)
Willow Flycatcher	Level of habitat alteration: Direct/indirect Cumulative	No direct, indirect, or cumulative effect on habitat alteration	Number of watersheds by level of habitat alteration Low = 48 (44) Mod. = 3 (NC) High = 17 (21)	Same as alternative 2	Same as alternative 2	Same as alternative 2
Siskiyou Mountain Salamander	Risk of disturbance: Direct/indirect Cumulative	No direct, indirect, or cumulative effect on habitat disturbance	Number of known sites by level of habitat disturbance Low = 19 (NC) Mod. = 0 (NC) High = 0 (NC)	Same as alternative 2	Same as alternative 2	Same as alternative 2

Species	Indicator	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Tehama Chaparral Snail	Likelihood of dispersal: Direct/indirect Cumulative	No direct, indirect, or cumulative effect on dispersal	Number of known sites by likelihood of dispersal Low = 3 (NC) Mod. = 0 (NC) High = 0 (NC)	Same as alternative 2	Same as alternative 2	Same as alternative 2
Western Bumble Bee	Level of habitat disturbance: Direct/indirect Cumulative	No direct, indirect, or cumulative effect on habitat disturbance	Number of watershed by level of habitat disturbance Low = 3 (0) Mod. = 5 (8) High = 5 (5)	Same as alternative 2	Same as alternative 2	Same as alternative 2
Hardwood Associated Species	Change in hardwood habitat abundance: Direct/indirect Cumulative	No direct, indirect, or cumulative effect on habitat abundance	Number of habitat acres affected 728 (1,322)	Number of habitat acres affected 717 (1,312)	Number of habitat acres affected 679 (1,273)	Number of habitat acres affected 713 (1,307)
Snag Associated Species						
White-headed, Vaux's, and Pileated woodpecker	Change in snag habitat abundance: Direct/indirect Cumulative	About 1,692 acres of general snag habitat will be affected cumulative effects in the project area	7,552 (8,283)	7,230 (7,961)	7,106 (7,837)	5,767 (6,498)
Hairy and Downy woodpecker	Change in snag habitat abundance: Direct/indirect Cumulative		6,428 (7,080)	6,121 (6,773)	6,010 (6,661)	4,851 (5,502)
Red-breasted woodpecker	Change in snag habitat abundance: Direct/indirect Cumulative		11,001 (12,735)	10,544 (12,278)	10,264 (11,999)	9,066 (10,801)

Species	Indicator	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Black-backed woodpecker	Change in snag habitat abundance: Direct/indirect Cumulative		1,123 (1,203)	1,108 (1,188)	1,096 (1,176)	916 (996)
Survey and manage species	Habitat acres: Direct/indirect Cumulative	No direct, indirect, or cumulative effect on known site protection	Number of known sites protected from habitat disturbance 76 sites	Same as alternative 2	Same as alternative 2	Same as alternative 2

* The number in the parenthesis represents the direct, indirect, and cumulative effect for each alternative and species.

Compliance with law, policy, regulation and the Forest Plan

All alternatives comply with the Endangered Species Act and other relevant laws, policies and regulations. Alternatives also comply with the Forest Plan as displayed on the Forest Plan consistency checklist, available on the project website.

Botany and Non-Native Invasive Species

The Westside Fire Recovery Project Botany Biological Assessment, Biological Evaluation, Survey and Manage Review, Noxious Weed Risk Assessment, and Pre-field documents: Appendices A-1, A-2, and A-3 are summarized in this section and are available in the project record. The purpose of this document is to evaluate the Westside Fire Recovery Project in sufficient detail to determine its effects on Endangered, Threatened, Proposed, Candidate, Sensitive, and Survey and Manage plant species as well as determine the risk of introducing or spreading Noxious Weed species. Unique botanical areas of concern are also addressed.

Methodology

An office pre-field review was conducted to determine if the Project is within the range of any federally listed, Threatened, Endangered, Proposed, Candidate, Sensitive, or Survey and Manage botanical species for the Klamath National Forest, and if suitable habitat is present within the proposed Project area. Additionally, the review indicated whether any populations of species of concern are known to be present within the Project area. All species listed for the Forest were considered in this review (USFWS 2104, USDA 2013).

Due to the expedited Project time frame, need to conduct surveys during appropriate times for identification (typically when blooming), and the obligation to assess the condition of known populations, it was unfeasible to conduct unit surveys in search of un-known populations of Sensitive species. Surveys to evaluate the status of known populations within Project activity areas will be conducted in the spring and summer of 2015 during appropriate times for identification. If populations are located within treatment areas and the habitat in its current state is likely to be negatively impacted by the proposed action, a project design feature intended to protect Sensitive species populations from a declining trend in viability. Due to the ephemeral appearance of fruiting structures, and the expedited time frame of the Westside Fire Recovery project, surveys for Sensitive fungal species were not practical. Sensitive fungi habitat in the Project area would be protected through the incorporation of Project design features associated with Forest Plan Standards and Guidelines for the Aquatic Conservation Strategy and woody material retention associated with wildlife habitat and soil stability and productivity.

The Bureau of Land Management and Forest Service have adopted standards and guidelines for the management of habitat for late-successional and old-growth forest related species within the range of the northern spotted owl, commonly known as the Northwest Forest Plan (NWFP). The NWFP includes measures for management of known sites, site-specific pre-habitat disturbing surveys, and/or landscape scale surveys for about 400 rare and/or isolated species. These species are grouped into six categories based on level of rarity, ability to reasonably and consistently locate occupied sites during pre-disturbance surveys, and the level of information known about the species or group (Table 1). The standards and guidelines for these mitigation measures are known as Survey and Manage (SandM).

Table 3-11: Requirements for Survey and Manage categories.

Category	Relative Rarity	Pre-disturbance surveys	Manage all known sites	Strategic surveys
A	Rare	Yes	Yes	Yes, not required for NEPA
B	Rare	No	Yes	Yes, NEPA requirement
C	Uncommon	Yes	High-priority only	Yes, not required for NEPA
D	Uncommon	No	High-priority only	Yes, not required for NEPA
E	Rare	No	Yes	Yes, not required for NEPA
F	Uncommon	No	No	Yes, not required for NEPA

To be in compliance with Survey and Manage direction pre-disturbance surveys will be conducted for Category A and C species in project activity units where known sites and suitable habitat are still present. Known occurrences within the Project area of Category B and E species and high-priority populations of Category D species will be protected for continued persistence at the site. If suitable habitat is present at known locations but known occurrences cannot be found, habitat elements will be protected to maintain the viability of the site. Project design features incorporated into the project for the protection of botanical species can be found in chapter 2.

The Klamath National Forest has a list of weeds that are being tracked and managed (appendix B of the Botanical Resources and Non –native Invasive Species report). There are a total of 30 high priority weeds on the list and fifteen species of moderate and low priority. A high priority weed species is one that is of important local management concern because of its currently limited distribution on the Forest, highly invasive nature, and demonstrated potential to displace large geographic areas of native plant communities. For this project, the risk analysis will only evaluate the likelihood for introducing and spreading high and moderate priority species. The low priority species present in the project area will not be considered in the analysis because it is of lesser concern on the Forest and is not considered an issue locally.

The invasive species risk assessment was completed to determine the risk of introducing and/or spreading non-native invasive species associated with the project. For projects having a moderate to high risk of introducing or spreading noxious weeds, the project decision document must identify noxious weed control measures that must be undertaken during project implementation (FSM 2903.04).

Based on site visits and RAVG data the following assumptions about habitat condition are made:

- areas characterized by high severity burns experienced 75 percent or greater vegetation mortality, loss of canopy and understory cover, and loss of duff layers and large woody debris;

- areas characterized by moderate severity burns experienced 50-75 percent vegetation mortality, substantial reduction in canopy and understory cover, as well as duff layers and large woody debris; and
- areas characterized by no or low severity burns experienced 0-50 percent vegetation mortality and a reduction in fuel loading.

Analysis Indicators

- Threatened, Endangered, Proposed, and Candidate Species: Likelihood of jeopardizing the continued existence of Threatened, Endangered, Proposed, or Candidate species populations.
- Sensitive Species: Trend of Sensitive species population viability measured as increasing, declining, or static.
- Survey and Manage Species: Compliance with Survey and Manage guidelines as defined by the 2001 Record of Decision.
- Non-native Invasive Species: Risk of introducing and/or spreading non-native invasive species measured by a rating of high, moderate or low risk.

Assumptions specific to Botanical Species of Concern

- Analysis is based on spatial population records only, field visits to known sites were not conducted prior to analysis;
- Botanical species of concern located in areas burned at moderate-high intensity, as indicated by RAVG data and salvage and site preparation and planting unit selection criteria, are assumed to be extirpated;
- Habitat located in areas burned at moderate-high intensity, as indicated by RAVG data and salvage unit criteria, are no longer expected to support viable populations of botanical species of concern (except *Thermopsis robusta* which prospers following disturbance);
- Strategic surveys for Survey and Manage Category B fungi are assumed to be complete (pending acceptance of the Draft Document by the Regional Ecosystem Office); and
- Survey and Manage guidelines will be used to analyze effects on botanical species that fall under both Sensitive and Survey and Manage categories because they provide for a more protective management strategy.

Assumptions specific to Non-native Invasive Species (NNIS)

- Analysis is based on spatial population records only, field visits to known sites were not conducted prior to analysis;
- Not all existing NNIS infestations are currently mapped;
- Existing NNIS infestations were spread during the 2014 fires and associated suppression efforts;
- It’s likely that new NNIS infestations were introduced during the 2014 fires and associated suppression efforts that are presently undetected;
- Roadside NNIS infestations are expected to continue to spread along road systems regardless of project activities;

- Inclusions of privately owned lands within the project boundary may contain infestations of NNIS that will spread to National Forest System lands regardless of Forest actions and/or efforts at prevention and control; and
- Once established, NNIS infestations are likely to persist long term.

Spatial and Temporal Context

The analysis area for botanical species of concern and non-native invasive species is the project area because it is the most relevant to changes to population viability and the risk of spread within the Project area. The temporal bounding for botanical species of concern and non-native invasive species will be less than five years for the short-term and greater than five years for long-term effects. Temporal bounding were chosen to account for species recovery times, seed dormancy and germination requirements, and the difficulty of identifying biennial and perennial vegetative life stages (rosettes).

Affected Environment

The Westside Fire Recovery project area is composed of the Beaver Fire (Subpart A), Happy Camp Complex (Subpart B), and Whites Fire (July Complex) (Subpart C) which all occurred on the Klamath National Forest during the summer of 2014. These fires resulted in a mosaic pattern of vegetation from the variety of burn intensities that occurred across the Project area.

Modification of the forest structure and composition as a result of fire intensity, duration, and suppression efforts has had a profound effect on microclimate characteristics such as air temperature, relative humidity, and soil temperature and moisture, which could, in turn, result in adverse impacts to native plant communities. In moderate and high burn severity areas, microclimate characteristics commonly associated with habitat for species of concern have likely been lost, however these areas also provide the opportunity for the unique and less frequent elements of the California flora known as fire followers to come to life and establish a seed bank that will persist waiting for the next event. These areas are also more vulnerable to invasion by noxious weeds due to the lack of ground cover that often acts as a barrier to establishment to non-native invasive species. Areas that experienced no or low burn severity may provide refugia for native species, and act as a seed source from which dispersal into the more intensely burned areas can occur.

Species of Concern

There are no known populations of Federally-listed threatened, endangered, proposed, or candidate species within the Project area; however, suitable habitat is present within subpart A for the Endangered lily, *Fritillaria gentneri.* Suitable habitat and/ or confirmed populations of 3 Sensitive species and 17 Survey and Manage species are present in the project area. A list of these species and the number of populations assumed alive within the project area is displayed below in Table 3-12.

Table 3-12: List of Sensitive and Survey and Manage botanical species known to be present in the Westside Fire Recovery project area.

Scientific Name	Status	Type	Populations In Project Area
Albatrellus flettii	Survey and Manage-B	Fungi	1

Scientific Name	Status	Type	Populations In Project Area
Alpova olivaceotinctus	Survey and Manage-B	Fungi	1
Cantharellus subalbidus	Survey and Manage-D	Fungi	2
Choiromyces alveolatus	Survey and Manage-B	Fungi	1
Cypripedium fasiculatum	Sensitive, Survey and Manage-C	Vascular plant	30
Cypripedium montanum	Sensitive, Survey and Manage-C	Vascular plant	23
Eriogonum hirtellum	Sensitive	Vascular plant	6
Erythronium hendersonii	Sensitive	Vascular plant	2
Gomphus clavatus	Survey and Manage-F	Fungi	1
Marsmius applanatipes	Survey and Manage-B	Fungi	1
Mycena tenax	Survey and Manage-B	Fungi	1
Otidea leporina	Survey and Manage-D	Fungi	2
Phaeocollybia californica	Survey and Manage-B	Fungi	1
Phaeocollybia fallax	Survey and Manage-D	Fungi	1
Phaeocollybia gregaria	Survey and Manage-B	Fungi	1
Phaeocollybia olivacea	Sensitive, Survey and Manage-E	Fungi	3
Ptilidium californicum	Survey and Manage-A	Bryophyte	4
Ramaria abietina	Survey and Manage-B	Fungi	1
Thermopsis robusta	Sensitive	Vascular plant	1
Tremiscus helvelloides	Survey and Manage-D	Fungi	2

Unique Botanical Areas of Concern

Lake Mountain Special Interest Area

This special interest area is composed of 100 acres and is the northern most known location of Foxtail pine. It is home to at least 6 different conifer species including: western white pine, foxtail pine, Shasta red fir, white fir, mountain hemlock, and Jeffrey pine. Such assemblages of high-elevation conifers are rare throughout California and are restricted to the Klamath-Siskiyou Mountains. Project design features have been incorporated into the *Westside Fire Recovery Environmental Impact Statement* in order to maintain foxtail pine snags within this Special Interest Area. The retention of foxtail pine snags is important in order to protect the unique features for which this Special Interest Area was designated.

Cultural Plant Collecting Area

The Cold Creek springs area within subpart B of the Project area is an important resource for *Adiantium aleuticum* which is frequently utilized by local Tribes for basket weaving and botanical remedies (Lloyd 1964). The maintenance and perpetuation of cultural botanical resource is required by Forest Standard and Guidelines (6-21). There are 6 units located in the Cold Creek springs area that may affect the continued viability of this resource. Project design features have been incorporated into the *Westside Fire Recovery Environmental Impact Statement* in order to continue to ensure its preservation and continuation.

Non-native Invasive Species

Twelve non-native invasive species are present within the project area. Of these, 7 are considered to be high priority, 4 are considered to be moderate priority and 1 is considered to be low priority on the Forest. The current risk of introduction and/or spread of NNIS is high due to the numerous NNIS populations present in and adjacent to the project area, the high level of disturbance from the 2014 fires which created habitat conditions that are extremely vulnerable to NNIS invasion, and the probability that the substantial use of the project area for recreation, wood cutting, and hunting will vector NNIS propagules into these vulnerable areas. A list of NNIS species, there Forest priority, number of populations, and acres of infestations in the project area are displayed below in Table 3.

Table 3. List of Non-native Invasive species known to be present in the Westside Fire Recovery project area.

Scientific Name	Forest Priority	Populations in Project area	Acres In Project area
Cardaria chalepensis	Moderate	4	2.5
Cardaria draba	Moderate	1	0.1
Centaurea maculosa	High	22	13.6
Centaurea pratensis	High	2	1.1
Centaurea solstitialis	Moderate	17	264.5
Centaurea squarrosa	High	5	0.9
Cirsium vulgare	Low	3	0.7
Cytisus scoparius	High	21	66.7
Euphorbia esula	High	55	28.6
Isatis tinctoria	Moderate	53	614.4
Lepidium latifolium	High	11	2.4
Tribulus terrestris	High	1	0.1

Environmental Consequences

Interactions between the project activities and the potential effects to botanical resources are discussed in detail in the Westside Fire Recovery project Botanical Resources and Non-native Invasive Species report and summarized here.

Alternative 1

Direct Effects and Indirect Effects

Threatened, Endangered, Proposed and Candidate Plant Species

There will be no direct or indirect effects to Threatened, Endangered, Proposed, or Candidate species because no populations are currently known within the Project area. Suitable habitat is present for *Fritillaria gentneri* within subpart C of the project area and will be surveyed for the presence of this species during appropriate times for identification. If populations are located, there would still be no direct or indirect effects because flag and avoid project design features will be incorporated that would protect newly discovered populations. Subsequently, there is no likelihood of jeopardizing the continued existence of TEPC species.

Sensitive Vascular Plants

There would be no direct effect to the three Sensitive botanical species located in the project area: *Eriogonum hirtellum, Erythronium hendersonii,* and *Thermopsis robusta*.

Indirect effects to *E. hirtellum* would be the adverse effects of increased competition from early seral species that were stimulated to germinate by the fire. Added competition in the short-term would cause a declining trend in population viability; however, the long-term trend in population viability would likely remain static as competition balances out.

Erythronium species have been reported to benefit from wildfire. Unfortunately, E. *hendersonii* populations are not within areas that burned during the 2014 fires and may be indirectly affected by not receiving the benefits fire provides this genus through prescribed burning treatments. The short-term trend in population viability would remain static; however, without a disturbance event, stable environmental conditions may cause a declining trend in population viability in the long-term.

Disturbance is necessary for the spread and continued vigor of *T. robusta* populations, unfortunately the known population received little disturbance during the 2014 fires. Indirect effects may occur from the further development of canopy cover and a stable environmental condition which would hinder seed germination and decrease suitable habitat in the short term. However, future natural disturbance, especially in areas of fuel accumulation, would allow for the creation of new habitat in the long-term. Subsequently, there would be a declining trend in population viability until the next disturbance event which could create conditions that would allow for an increasing trend in population viability.

Sensitive Bryophytes, Lichens, and Fungi

There would be no direct or indirect effects to Sensitive bryophyte, lichen or fungi species because none are known within the project area. Suitable habitat within none to moderately burned areas may be present. Indirect effects to suitable habitat for Sensitive bryophytes, lichens, and fungi are described below.

Heavy fuel loading from the accumulation of dead, burnt snags and debris from the 2014 fires is likely to have an indirect negative effect on potential habitat for Sensitive bryophyte, lichen, and fungal species by creating conditions conducive to high severity wildfire in the future.

Sedimentation of springs and headwater streams may have a negative indirect effect on the aquatic habitat for the sole Sensitive Lichen species causing a declining trend in potential population viability (see Hydrology report).

Sensitive ectomycorrhizal fungi rely on the presence of a live host trees for their continued existence and forest re-establishment in severely burned areas may be delayed due to the loss of cone-bearing trees thereby indirectly postponing Sensitive ectomycorrhizal fungal re-colonization. This would cause a decline in potential population viability because the recovery time for suitable habitat would be hindered.

Survey and Manage Vascular Plants, Bryophytes, Lichens and Fungi

There would be no direct effects to Survey and Manage vascular plant, bryophyte, lichen and fungi species or habitat therefore the project would be in compliance with Survey and manage regulations.

Suitable habitat and known populations may be indirectly affected under alternative 1; however, these indirect effects will not affect compliance with Survey and Manage regulations. Downed woody debris would provide protected safe site for seed germination indirectly benefiting plant community composition. Standing burnt trees would provide perches for seed dispersing birds, but may also fall on populations damaging them and blocking germinating seeds and emerging seedlings. Re-forestation may be delayed in severely burned areas due to the loss of cone-bearing trees thereby indirectly postponing Survey and Manage mycorrhizal fungal recolonization. Accumulation of dead trees would generate high fuel loads creating conditions conducive to high severity wildfire which would cause a negative indirect effect to Survey and Manage species.

Non-native Invasive Species

There would be no direct effect to Non-native Invasive species from project activities.

Existing NNIS populations would continue to spread at their current or higher rates due to the disturbance from the 2014 fire and suppression efforts, the subsequent habitat vulnerability, and the numerous non-project dependent vectors that are present in or utilize the project area.

The risk of introduction and/or spread of NNIS under this alternative is high due to the numerous NNIS populations present in and adjacent to the project area, the high level of disturbance from the 2014 fires which created habitat conditions that are extremely vulnerable to NNIS invasion, and the probability that the substantial use of the project area for recreation, wood cutting, and hunting will vector NNIS propagules into these vulnerable areas.

Cumulative Effects

There are no cumulative effects for Threatened, Endangered, Proposed, or Candidate species, because there will be no direct or indirect effects.

All activities and factors listed in Appendix C could have additional effects to Sensitive, Survey and Manage, and Non-native invasive species populations in the project area when added to alternative 1. On-going and future foreseeable Forest projects have been and will be evaluated for effects to Sensitive, Survey and Manage and Non-native Invasive species. Project design features have been incorporated into these past projects to limit their effects on Sensitive, Survey and Manage and Non-native Invasive species populations. It is expected that because of these evaluations and the inclusion of project design features, cumulative effects from Forest projects will have a neutral effect on population viability trends for Sensitive species, on Forest compliance with Survey and Manage regulations, and on the risk of introducing and/or spreading NNIS.

Projects on private lands are not required to protect Sensitive botanical species, and subsequently actions on private lands may lead to a localized downward trend in population viability for these species. If that is the case, on-going and future foreseeable projects on private lands would have a declining cumulative effect on population viability trends for Sensitive species. However, without knowing how many species and/or populations are present, how many may be effected, and how project activities will affect habitat conditions it is difficult to determine how potential effects from private actions would cumulatively influence population viability trends for Sensitive botanical species.

Forest compliance with Survey and Manage regulations requires pre-disturbance surveys for habitat-disturbing projects (Category A and C species only), and the management of known and high-priority sites for continued persistence. On-going and future foreseeable Forest projects would not cumulatively affect Survey and Manage botanical species and would comply with regulations if project design features structured to protect Survey and Manage populations and associated habitats are implemented. Additionally, on-going and future foreseeable projects on private land that affect Survey and Manage botanical species would have no effect on whether the Westside Fire Recovery project is in compliance with these regulations since they pertain only to Forest occurrences and lands. Therefore, the project would continue to comply with Survey and Manage regulations regardless of cumulative actions on Forest or private lands.

There are 8 grazing allotments that overlap treatment units and may contribute to the long-distance dispersal of NNIS infestations in the project area. Livestock mainly transport NNIS propagules on their fur or through ingestion. Many NNIS have barbed or prickly seeds that readily adhere to animal fur and may potentially be transported long-distance and/or fall off in areas that are currently weed-free. Since many NNIS seeds can pass through the stomach unaffected, ingested seeds may also introduce NNIS to new areas once they are expelled. The added cumulative effects of grazing to Alternative 1 would likely increase the risk of NNIS introduction and spread.

Projects on private lands are not required to mitigate for the spread and/or introduction of NNIS species which could also increase negative cumulative effects to NNIS populations and subsequently raise the risk rating.

The BAER team analyzed the project area and prescribed emergency treatments to help limit the introduction and spread of NNIS from the 2014 fires and suppression activities. Emergency treatments will take place in the first year following the fires (2015) and will include additional surveys for NNIS within the fire footprints and contingency areas as well subsequent hand removal of newly located infestations. These treatments will help control the introduction and spread of annual NNIS species, such as *Centaurea solstitialis*. Unfortunately, biennial and perennial species that have a rosette lifestage are difficult to locate in the first year because of their short stature, and may not be found during these surveys. The Forest Noxious Weed Detection and Treatment program would also continue to survey for and treat new populations that may be introduced or spread onto Forest lands through on-going and future foreseeable Forest and Private land projects; however, the cumulative risk for the introduction and spread of NNIS would remain high due to the particularly vulnerable condition of the habitat.

Alternative 2

Direct Effects and Indirect Effects

Threatened, Endangered, Proposed and Candidate Plant Species

There will be no direct or indirect effects to Threatened, Endangered, Proposed, or Candidate species because no populations are currently known within the Project area.

Suitable habitat is present for *Fritillaria gentneri* within subpart C of the project area and this area will be surveyed for the presence of *F. gentneri* during appropriate times for identification. If populations are located, there would still be no direct or indirect effects because flag and avoid project design features will be incorporated that would protect newly discovered populations. Subsequently, there is no likelihood of jeopardizing the continued existence of TEPC species.

Sensitive Vascular Plants

Eriogonum hirtellum:

Direct effects to *E. hirtellum* are unlikely because this species is restricted to bald serpentine outcrops and gravelly slope and ridges that typically have no overstory cover and very little understory vegetation. Due to the open characteristic of *E. hirtellum* habitat, equipment may be transported through the area which could potentially damage some individuals within the populations. *Eriogonum hirtellum* populations may be indirectly effected by increased competition from early seral species that were stimulated to germinate by the fire. In the short-term, these effects would have a declining effect on population viability as individuals are impacted. However, because effects would be minimal and to individuals and not the population as a whole, the long term trend in population viability would remain static.

Erythronium hendersonii:

Direct effects to *E. hendersonii* populations would be both beneficial and negative to population persistence. The removal of excess understory vegetation would provide a beneficial effect by opening up habitat and reducing light competition; and negative effects would occur to specific individuals and portions of the habitat where piles are burned. Project design features will mitigate effects to underground bulbs from pile burning; subsequently, this alternative would result in an increasing trend in population viability due to the beneficial impacts of fuels treatments on suitable habitat.

Thermopsis robusta:

Effects to this population would be both beneficial and negative. Use of the gravel pullout where this population occurs would provide a short term benefit by creating disturbance necessary for the creation of new suitable habitat and population expansion. However, vegetation recovery and encroachment would cause negative long-term effects on population viability. While there would be a short-term increasing trend in population viability due to use of the gravel pullout, overall there would be a declining trend in population viability until the next disturbance event that would again allow for an increasing trend in population viability.

Sensitive Bryophytes, Lichens, and Fungi

There would be no direct or indirect effects to Sensitive bryophyte, lichen or fungi species as a result of Alternative 2, because none are known within the project area. Suitable habitat within none to moderately burned areas may be present. Indirect effects to suitable habitat for Sensitive bryophytes, lichens, and fungi are described below.

Fuels treatments would provide an indirect, long-term benefit to suitable habitat by reducing excessive fuel loading and the potential for another high severity wildfire in the future which would cause an increasing trend in potential population viability through the maintenance and protection of suitable habitat.

Conifer planting associated with this alternative may indirectly benefit sensitive ectomycorrhizal fungi by increasing the speed at which severely burned areas are reforested. This would cause an increasing trend in potential population viability through the creation and restoration of suitable habitat.

Sedimentation of springs and headwater streams may have a negative indirect effect on the aquatic habitat for the sole Sensitive Lichen species. The risk of sedimentation would increase under this alternative in comparison to alternative 1, causing a more precipitous decline in potential population viability because suitable habitat would have a higher risk of degradation. However, legacy site restoration will reduce the risk of sedimentation in the Elk creek watershed resulting in a static trend in potential population viability in that specific watershed (see the Hydrology report).

Survey and Manage Plant Species

Cypripedium fasciculatum and Cypripedium montanum:

Eighteen *C. fasciculatum* and 16 *C. montanum* populations are present within activity units. These are both Category C species, and thus to be in compliance with Survey and Manage guidelines populations deemed high priority must be protected. High priority will be given to robust, healthy populations located in areas with intact suitable habitat present following the 2014 fires. Implementation of flag and avoid protection measures for high priority populations would result in very minimal direct effects to *C. fasciculatum* and *C. montanum* populations as well as compliance with required guidelines. This alternative is expected to provide a long-term benefit to *C. fasciculatum* and *C. montanum* populations and suitable habitat by reducing excessive fuel loading and the potential for a high severity wildfire.

Survey and Manage Bryophytes

Ptilidium californicum:

There are 2 populations of *P. californicum* located in in roadside hazard activity units. *Ptilidium californicum* is a Category A species, and thus to be in compliance with Survey and Manage guidelines all known sites must be protected. Implementation of flag and avoid protection measures would result in no direct effects to populations ensuring compliance with required guidelines.

Roadside treatments may indirectly effect *P. californicum* populations by creating small canopy openings adjacent to populations. This would be a short-term effect as larger canopy elements would be maintained and shading to the habitat would not be significantly reduced. The reduction in excessive fuels may indirectly benefit populations by reducing the risk of a future high severity wildfire.

Survey and Manage Fungi

Albatrellus flettii:

There is 1 *A. flettii* population located in an activity unit. *Albatrellus flettii* is a Category B species, and thus to be in compliance with Survey and Manage guidelines all known sites must be protected. Implementation of flag and avoid protection measures would result in no direct effects to this population ensuring compliance with required guidelines. Subsequently, there would be no likelihood of effecting this population. However, there is the likelihood that project activities would beneficially affect suitable habitat by reducing excessive fuels, thereby decreasing the risk of a future high severity fire event that would kill host trees and moisture requirements necessary for survival.

Otidea leporina:

There is 1. *O. leporina* populations located in an activity unit. *Otidea leporina* is a Category D species, and thus to be in compliance with Survey and Manage guidelines populations deemed high priority must be protected. Little is known about this species making it difficult to designate whether it is a high-priority population. If appropriate habitat components are present to support mycorrhizal and saprophytic fungi this population will be designated high-priority. Implementation of flag and avoid protection measures will result in no direct effects to this population as well as compliance with required guidelines.

Phaeocollybia californica and Phaeocollybia olivacea:

There is 1 population of *P. californica* and 2 populations of *P. olivacea* located in activity units. *Phaeocollybia californica* is a Category B species and *P. olivacea* is a Category E species which both require the protection of all known sites in order to be in compliance with Survey and Manage guidelines. Implementation of flag and avoid protection measures would result in no direct effects to these populations ensuring compliance with required guidelines. Project activities would beneficially affect suitable habitat by reducing excessive fuels, thereby decreasing the risk of a future high severity fire event that would kill host trees and moisture requirements necessary for survival.

Tremiscus helvelloides:

There is 1 population of *T. helvelloides* located in an activity unit. *Tremiscus helvelloides* is a Category D species and thus to be in compliance with Survey and Manage guidelines high-priority populations must be protected. This population will be considered high priority if the habitat still provides adequate shade, moisture, and substrate necessary to support jelly fungi. Implementation of flag and avoid protection measures will result in no direct effects to this population as well as compliance with required guidelines. Prescribed burn treatments would have a beneficial indirect effect on these populations by reducing excessive fuels, thereby decreasing the risk of a future high severity fire event.

Non-native Invasive Species

The project area is already highly susceptible to NNIS infestation regardless of project activities due to the numerous NNIS infestations already present, the vulnerability of the project area from the 2014 fires, and the high recreational use of the area. Project activities are not expected to increase invasion potential through the removal of canopy cover or duff layers because these elements were already lost during the 2014 fires.

In this alternative, the five risk factors combined have a **high** potential for NNIS introduction and spread within the project area when compared to alternative 1, due to the higher level of ground disturbing activities and increased vectors. Ground disturbance that includes the movement of soils contaminated with NNIS propagules, such as road and landing construction, grading, and treatment of watershed legacy sites, would directly contribute to the spread of these infestations. With extensive infestations occurring along roadways, dispersal distance may be increased through transport on recreational or project related vehicles and equipment. Helicopter logging in areas infested with NNIS would increase the rate of spread because down drafts from rotor blades could displace weed seeds and disperse them over large distances. Water-tenders could also spread NNIS propagules through waterways when filling their tanks, allowing new infestations to establish downstream.

Project design features and mitigation measures would minimize these effects; however the risk would remain high due to the pre-existing condition. Continuation of the existing Forest weed monitoring and treatment would detect any new high-priority weed sites that may become established within the project area. Quickly treating these sites will limit new NNIS establishment.

Cumulative Effects

There are no cumulative effects for Threatened, Endangered, Proposed, or Candidate species, because there will be no direct or indirect effects.

All activities and factors listed in appendix C of the *Westside Fire Recovery project Environmental Impact Statement* could have additional effects to Sensitive, Survey and Manage, and Non-native invasive species populations in the project area when added to alternative 2. On-going and future foreseeable Forest projects have been and will be evaluated for effects to Sensitive, Survey and Manage and Non-native Invasive species. Project design features have been or will be incorporated into ongoing and future foreseeable Forest projects to limit their effects on Sensitive, Survey and Manage and Non-native Invasive species populations.

Sensitive species viability and persistence may be both beneficially and negatively affected by cumulative Forest projects. Project design features have been or will be incorporated into all on-going and future foreseeable Forest projects to limit negative effects on population viability trends. Consequently, the cumulative effect of Forest projects on Sensitive species would be expected to cause a short-term declining trend in population viability as individuals are lost, but would create a long-term increasing trend in population viability from the beneficial impacts of management activities on suitable habitat (i.e. fuel treatments, conifer planting, habitat creation, etc.).

Projects on private lands are not required to protect Sensitive botanical species, and subsequently actions on private lands may lead to a localized downward trend in population viability for these species. If that is the case, on-going and future foreseeable projects on private lands would have a declining cumulative effect on population viability trends for Sensitive species. However, without knowing how many species and/or populations are present, how many may be effected, and how project activities will affect habitat conditions it is difficult to determine how potential effects from private actions would cumulatively influence population viability trends for Sensitive botanical species.

Forest compliance with Survey and Manage regulations requires pre-disturbance surveys for habitat-disturbing projects (Category A and C species only), and the management of known and high-priority sites for continued persistence. On-going and future foreseeable Forest projects would not cumulatively affect Survey and Manage botanical species and would comply with regulations if project design features structured to protect Survey and Manage populations and associated habitats are implemented. Additionally, on-going and future foreseeable projects on private land that affect Survey and Manage botanical species would have no effect on whether the Westside Fire Recovery project is in compliance with these regulations since they pertain only to Forest occurrences and lands. Therefore, the project would continue to comply with Survey and Manage regulations regardless of cumulative actions on Forest or private lands.

The five risk factors combined have a high potential for NNIS introduction and spread within the project area for Alternative 2, due to the high level of ground disturbing activities and increased vectors. Project design features and mitigation measures would minimize these effects; however the risk would remain high due to the pre-existing condition. On-going and future foreseeable projects would also implement mitigation measures aimed at reducing NNIS introduction and spread. Unfortunately, project design features cannot eliminate risk and it is expected that new NNIS infestations may still become established despite these mitigation measures. Consequently, on-going and future foreseeable Forest projects have the potential to elevate the cumulative risk of NNIS introduction and spread, resulting in a continued risk rating of high.

There are 8 grazing allotments that overlap treatment units and may contribute to the long-distance dispersal of NNIS infestations in the project area. Livestock mainly transport NNIS propagules on their fur or through ingestion. Many NNIS have barbed or prickly seeds that readily adhere to animal fur and may potentially be transported long-distance and/or fall off in areas that are currently weed-free. Since many NNIS seeds can pass through the stomach unaffected, ingested seeds may also introduce NNIS to new areas once they are expelled. The added cumulative effects of grazing to Alternative 2 would likely increase the risk of NNIS introduction and spread. Projects on private lands are not required to mitigate for the spread and/or introduction of NNIS species which could also increase negative cumulative effects to NNIS populations and subsequently raise the risk rating.

The BAER team analyzed the project area and prescribed emergency treatments to help limit the introduction and spread of NNIS from the 2014 fires and suppression activities. Emergency treatments will take place in the first year following the fires (2015) and will include additional surveys for NNIS within the fire footprints and contingency areas as well subsequent hand removal of newly located infestations. These treatments will help control the introduction and spread of annual NNIS species, such as *Centaurea solstitialis.* Unfortunately, biennial and perennial species that have a rosette lifestage are difficult to locate in the first year because of their short stature, and may not be found during these surveys. The Forest Noxious Weed Detection and Treatment program would also continue to survey for and treat new populations that may be introduced or spread onto Forest lands through on-going and future foreseeable Forest and Private land projects; however, the cumulative risk for the introduction and spread of NNIS would remain high due to the particularly vulnerable condition of the habitat.

Alternative 3 and 4

Direct, Indirect, and Cumulative Effects

Threatened, Endangered, Proposed and Candidate Plant Species

These alternatives will have the same direct, indirect, and cumulative effects to Threatened, Endangered, Proposed, and Candidate botanical species as Alternative 2 and the same project Design Features would be incorporated to mitigate those effects.

Sensitive Vascular Plants, Bryophytes, Lichens, and Fungi

These alternatives will have the same direct, indirect, and cumulative effects to Sensitive botanical species as Alternative 2 and the same project Design Features would be incorporated to mitigate those effects. Additionally, the added retention of snag clumps and coarse woody debris under this Alternative would indirectly benefit habitat for Sensitive bryophytes and fungi by mitigating effects to microclimate and providing substrate.

Survey and Manage Vascular Plants, Bryophytes, and Fungi

These alternatives will have the same direct, indirect, and cumulative effects to Survey and Manage species as Alternative 2 and will incorporate the same project Design Features to mitigate those affects. Additionally, the added retention of snag clumps and coarse woody debris under this Alternative would indirectly benefit habitat for Survey and Manage bryophytes and fungi by mitigating effects to microclimate and providing substrate.

Non-native Invasive Species

Direct, indirect, and cumulative effects from these alternatives to the spread and introduction of NNIS infestations would be the same as for Alternative 2 and the same Project Design Features would be incorporated to mitigate those affects.

Alternative 5

Direct Effects and Indirect Effects

Threatened, Endangered, Proposed and Candidate Plant Species

These alternatives will have the same direct, indirect, and cumulative effects to Threatened, Endangered, Proposed, and Candidate botanical species as Alternative 2 and the same project Design Features would be incorporated to mitigate those effects.

Sensitive Vascular Plants, Bryophytes, Lichens, and Fungi

This alternative will have the same direct, indirect, and cumulative affects to Sensitive botanical species as Alternative 2 and will incorporate the same Project Design Features to mitigate those affects.

Survey and Manage Vascular Plants, Bryophytes, and Fungi

This alternative will have the same direct, indirect, and cumulative affects to Survey and Manage botanical species as Alternative 2 and will incorporate the same Project Design Features to mitigate those affects.

Non-native Invasive Species

Direct, indirect, and cumulative effects from this alternative to the spread and introduction of NNIS infestations would be slightly less than for Alternative 2, because of the reduction in acres treated, resulting in less disturbed ground and chance of introduction of new species. The decrease in risk is very minimal and not enough to lower the risk rating from **high.** The same Project Design Features would be incorporated to mitigate effects.

Comparison of Effects

Table 3-13: Comparison of effects to Species of Concern and NNIS by Alternatives.

Group	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
TEPC	No direct, indirect or cumulative effects	No direct, indirect or cumulative effects	Same as Alt 2	Same as Alt 2	Same as Alt 2
Sensitive	No direct effects Indirect effects from competition, lack of disturbance, delayed reforestation, sedimentation of aquatic habitat, and increased risk of fire	Direct effects to individuals may occur, but are not likely to result in a trend toward federal listing or a loss in population viability	Same as Alt 2. Additionally, the added retention of snag clumps and coarse woody debris would mitigate microclimate and provide substrates for Sensitive species	Same as Alt 2. Limiting treatments in Riparian Reserves would protect the majority of habitat for Sensitive bryophytes and fungi, reduced road construction would limit risk of stream sedimentation.	Same as Alt 2
Survey and Manage	No direct effects Indirect long-term effects from competition, lack of disturbance, delayed reforestation, and increased risk of fire	No direct effects to Category A, B and E species because all known sites would be protected. Minimal direct effects to Category C and D species because high priority sites would be protected with the implementation of project design features.	Same as Alt 2. Additionally, the added retention of snag clumps and coarse woody debris would mitigate microclimate and provided substrates for Survey and Manage species	Same as Alt 2. Limiting treatments in Riparian Reserves would protect the majority of habitat for Survey and Manage bryophytes and fungi	Same as Alt 2
NNIS	No direct effects Indirect long-term effects from habitat disturbance and non-project dependent vectors	High risk of spread due to numerous existing NNIS populations, habitat vulnerability, non-project and project dependent vectors, and ground disturbing activities.	Same as Alt 2	Same as Alt 2	Risk of NNIS spread would be slightly less than for the Alternative 2. The decrease in risk is very minimal and not enough to lower the risk rating from high.

Determination of Effects

Alternative 1

Under alternative 1, it is my determination that the Westside Fire Recovery project **will not affect** the Sensitive plant species: *Eriogonum hirtellum, Erythronium hendersonii, and Thermopsis robusta.*

Alternative 2

Under alternative 2, it is my determination that the Westside Fire Recovery project **may affect individuals, but is not likely to result in a trend toward federal listing or a loss of viability *for*** the Sensitive plant species: *Eriogonum hirtellum, Erythronium hendersonii, and Thermopsis robusta.*

Alternative 3

Under alternative 3, it is my determination that the Westside Fire Recovery project **may affect individuals, but is not likely to result in a trend toward federal listing or a loss of viability *for*** the Sensitive plant species: *Eriogonum hirtellum, Erythronium hendersonii, and Thermopsis robusta.*

Alternative 4

Under alternative 4, it is my determination that the Westside Fire Recovery project **may affect individuals, but is not likely to result in a trend toward federal listing or a loss of viability *for*** the Sensitive plant species: *Eriogonum hirtellum, Erythronium hendersonii, and Thermopsis robusta.*

Alternative 5

Under alternative 5, it is my determination that the Westside Fire Recovery project **may affect individuals, but is not likely to result in a trend toward federal listing or a loss of viability *for*** the Sensitive plant species: *Eriogonum hirtellum, Erythronium hendersonii, and Thermopsis robusta.*

Compliance with Law, Regulation, Policy, and the Forest Plan

<u>Threatened, Endangered, and Sensitive Botanical Species:</u> The Westside Fire Recovery project complies with section 7 of the Endangered Species Act of 1973, as amended, in the preparation of a Biological Assessment and Biological Evaluation and the disclosure of effects; Forest Service Policy (FSM 2670), and Klamath National Forest Plan Standards and Guidelines for Sensitive plant species have been met by managing populations for viability where possible.

<u>Survey and Manage Plants:</u> The Westside Fire Recovery project complies with the 2001 Record of Decision and Standards and Guidelines for Amendments to the Survey and Manage, Protection Buffer, and other Mitigation Measures Standards and Guidelines by preparing an assessment and documenting effects (USDA 2014a).

<u>Non-native Invasive Species:</u> The Westside Fire Recovery project complies with Forest Service Manual 2900 and Forest Plan Standards and Guidelines for Non-native invasive species by preparing the Noxious Weed Risk Assessment, and providing Project Design Features to minimize effects.

Range

The purpose of this section is to describe the condition of the range resource in the Westside Fire Recovery project (project) area and how rangeland resources may be affected by the proposed action and alternatives for this project.

Methodology

The method used to determine effects on rangeland resources included a qualitative comparison of each alternative's likelihood of affecting the amount of forage available for livestock use and rangeland condition. Existing rangeland conditions were determined through field visits, monitoring data, and historical records for each allotment.

To describe the rangeland resources in the project area and analyze alternatives, the following Klamath National Forest Geographic Information System data files were used:

- Allotment and unit/pasture boundaries;
- Fire intensity; and
- Project alternative maps.

Condition and trend of rangelands is determined by monitoring "key areas" on upland, meadow, and riparian rangeland areas. Key areas are a small ecological site or plant community that is responsive to management actions and indicative of the larger ecological site or plant community they are intended to represent (USDI 1999b). Condition and trend monitoring protocols employed include Best Management Practices Effectiveness Program (BMPEP), Photo Point Monitoring, and Rooted Frequency.

Following the 2014 fires, ocular observations were made to ground truth the fire intensity maps, assess condition of key areas, and estimate vegetation regrowth potential for forage.

Analysis Indicators

The effects of the project on rangeland resources are evaluated using two analysis indicators:

- Amount of Available Forage
- Rangeland Condition

Amount of forage and rangeland condition are the biggest impact to allotment viability. Adequate forage is needed to sustain cattle grazing without exceeding rangeland standards and guidelines and rangeland condition can indicate if grazing is a proper use of the land.

Spatial and Temporal Context

The spatial limits of this analysis are limited to the grazing allotments which fall within the project area. This allows for analysis of the total effect to all rangeland resources associated with the project. Due to the nature of grazing permits, effects are measured in the short term of 10 years or less and long term of 20 years to consider trend of the rangeland resource.

Affected Environment

The project encompasses portions of the East Beaver, Dry Lake, Horse Creek, Johnny/Seiad, South Klamath, Big Ridge, Scott Bar Mountain, Marble Valley, Etna Creek, and South Russian allotments and includes all areas on the Lake Mountain and Middle Tompkins allotments. Allotment names, status, use period, and permitted cow/calf pair numbers are provided in table 3-14.

Table 3-14: Allotments within the project boundary

Area	Allotment Name	Status	Use Period and Permitted Number
Beaver Fire	East Beaver	Active	4/1-6/15, 44 pairs 6/16-10/30, 250 Pairs
Beaver Fire	Dry Lake	Active	4/15-5/09, 116 pairs 5/10-10/15, 170 Pairs
Beaver Fire	Horse Creek	Active	4/15-10/15, 101 pairs
Beaver Fire	Johnny/Seiad	Vacant	N/A
Happy Camp Complex	Scott Bar Mountain	Vacant	N/A
Happy Camp Complex	Lake Mountain	Active	7/15-10/15, 25 pairs
Happy Camp Complex	Middle Tompkins	Vacant	Currently being analyzed
Happy Camp Complex	Big Ridge	Active	7/15-10/15, 120 Pair
Happy Camp Complex	Marble Valley	Active	7/15-10/15, 35 Pair
Whites Fire	Etna Creek	Active	7/15-10/15, 54 pair
Whites Fire	South Russian	Active	7/15-10/15, 40 pair

Seiad/Johnny, South Klamath, and Scott Bar Mountain will not be discussed further as they are vacant and are not expected to be restocked within the next 10 years. Middle Tompkins is also vacant; however, it is included because it is currently undergoing analysis to update the allotment management plan. Although Big Ridge is within the project boundary, it will not be discussed further as all grazing activities are in wilderness and therefore treatments will not overlap with rangeland resources.

Allotment Monitoring

Rangeland condition assessment methods most commonly used on the Forest are Rooted Frequency Plots (USDI, 1999a) in key areas. Table 2 shows the most current reading of rooted frequency plots within the affected allotments.

Table 3-15: Condition based on Rooted Frequency Plots

Allotment	Plot Name	Year of Last Reading	Vegetation Type	Vegetation Condition[1]	Overall Conditon[2]	Ecological Condition[3]
Dry Lake	KLA1402-Dead Cow*	2014	Moist Meadow	Fair	Good	Satisfactory
East Beaver	KLA9904-Trapper Creek*	2009	Wet Meadow	Moderate	Moderate	Satisfactory
East Beaver	KLA0202-Trapper Creek*	2007	Dry Meadow	Moderate	Moderate	Satisfactory
Horse Creek	No Frequency Plots Established					
Lake Mountain	KLA1301-Kuntz Creek	2013	Dry Meadow	Moderate	Moderate	Satisfactory
Middle Tompkins	KLA1302-Tyler Meadows	2013	Moist Meadow	Moderate	High	Satisfactory

Allotment	Plot Name	Year of Last Reading	Vegetation Type	Vegetation Condition[1]	Overall Conditon[2]	Ecological Condition[3]
Middle Tompkins	KLA1201- Middle Creek Meadows	2012	Moist Meadow	Moderate	Moderate	Satisfactory
Marble Valley	KLA0103- Big Rock*	2006	Moist Meadow	Moderate	Low	Unsatisfactory
Etna Creek	KLA1401- Meeks Meadow*	2014	Moist Meadow	Good	Good	Satisfactory
South Russian	No Frequency Plots Established					

*Plot is not within the Westside Project boundary but is the nearest key area within the allotment that is representative of rangeland conditions.

[1]Vegetation condition:. There are two ranking scales displayed in the table because region 5 recently changed their scoring system for rangeland plots. High, Moderate, and Low refer to high seral, mid seral and early seral respectively. The terms poor, fair, good, and excellent are the current classifications for rangeland condition.

[2] Overall condition is based upon hydrologic, vegetative, and soil conditions.

[3]Ecological condition simply summarizes overall condition as either satisfactory or non-satisfactory

As outlined in table 2, most rangeland key areas are in satisfactory condition. Marble Valley is in unsatisfactory condition due to shallow rooting depth and bare soil, which can put rangeland at risk of undesirable plant invasion. However, the vegetation in the Marble Valley area had been maintaining mid-seral species since 2001 and reevaluation of this site is expected to occur in 2015. Conditions within the South Russian and Horse Creek areas have been measured by other methods, thus no frequency plots have been established to date.

Riparian conditions on the Forest allotments are assessed through the BMPEP (table 3-16). The grazing protocol for the Pacific Southwest Region (Region 5) of the Forest Service records herbaceous and woody utilization levels, stream-bank disturbance, ground cover, bank angle, riparian and upslope erosion, and riparian vegetation condition.

Table 3-16: Most current BMPEP rating for each allotment within the project area

Allotment Name	Key Area	Year Evaluated	Met Implementation Standards?	Met Effectiveness Criteria?
Dry Lake	Dead Cow*	2009	Yes	Partial
East Beaver	West Long John*	2008	Yes	Yes
Horse Creek	Salt Creek*	2012	Yes	Yes
Lake Mountain	Lookout Spring	2013	Partial	Partial
Middle Tompkins	Tyler Meadows	2008	Yes	Yes
Marble Valley	South Fork Kelsey	2009	Yes	Yes
Etna Creek	Meeks Meadow	2010	Partial	Partial
South Russian	Lees Meadow	2013	Yes	Yes

Allotments that met both implementation and effectiveness BMPEP criteria demonstrate that grazing is not degrading water resources in the allotment. Changes in grazing management are recommended and implemented for sites that partially meet the criteria.

In the three allotments that partially met effectiveness criteria, trampling had caused stream-bank vulnerabilities or exposed soil at the edges of ponds. These disturbances were localized and did not cause impacts to beneficial uses such as fisheries and wildlife use.

2014 Wildfire

During the summer of 2014, the Beaver, Happy Camp Complex, and Whites fires burned about 200,000 acres of land. As a result, the project was developed in response to landscape-level changes to forested habitat resulting from the 2014 wildfires on the Klamath National Forest. Table 4 outlines the levels of burn mortality by acre for each allotment as a result of these fires.

Table 3-17: Fire intensity

Allotment Name	Total Allotment Acres	1-10 %	10-25 %	25-50 %	50-75 %	75-90 %	>90 %	Total Burned Acres	Percentage of allotment acres burned
Dry Lake	41,501	2962	1704	2031	1633	1046	7890	17,266	42 %
East Beaver	67,042	1941	982	920	685	399	2567	7,494	11 %
Horse Creek	37,055	401	191	188	147	94	1017	2,038	6 %
Lake Mountain	9,655	1334	724	838	686	455	2735	6,772	70 %
Middle Tompkins	14,736	3204	1471	1344	795	420	1759	8993	61 %
Marble Valley	8,136	7	2	2	0	0	0	11	<1 %
Etna Creek	18,903	351	112	94	63	48	253	921	5 %
South Russian	13,200	647	275	269	215	149	796	2351	18 %
Total	210,228	10,847	5,461	5,686	4,224	2611	17,017	45,846	21 %

Field visits performed after the fire revealed that burning was patchy and irregular throughout the allotments. The fire severity drifted toward the extreme with most acres either being in the 1-10 percent mortality category or over 90 percent mortality category. The most intense burning occurred where dense closed canopy forest dominated the landscape. Herbaceous forest understory and shrublands were burned in a patchy manner, but because this forage component is widely scattered and separated, effects could not be comprehensively assessed at time of inspection. Direct effects of the burn on meadows were minimal. Most meadows were either unburned or lightly burned in some areas. In general, the fire did not produce serious mortality on primary rangeland to the point of altering existing conditions.

To allow for post-fire recovery of vegetation, livestock grazing areas will be modified within the project area where necessary. For the Middle Tompkins allotment, livestock grazing permits will not be authorized until 2016 or later. Lake Mountain and Dry Lake allotments will be monitored prior to the 2015 grazing season to determine if vegetation has recovered enough to support grazing and grazing won’t hinder tree establishment. If grazing is allowed, animals may be turned out at a later date and/or the season may be shortened in the fall to allow for optimal vegetation recovery and the most beneficial use of livestock grazing. These modifications for post-fire livestock use of rangelands will be variable based to rangeland conditions and climate as observed by rangeland managers.

Environmental Consequences

Alternative 1

Direct and Indirect Effects

Under alternative 1, no treatments are proposed for the project area. As a result, there will be no direct effects to rangeland resources, and rangelands will slowly heal from wildfire effects. New areas of transitory rangeland will likely be available for livestock and wildlife where moderate or low severity burns occurred. Not removing hazardous trees through salvage harvest, hazardous fuels treatments, roadside hazard treatments, and site preparation, planting and release may limit livestock access to forage in the short term and could make livestock management (turnout, moving, and gathering cattle) dangerous for permittees. Areas that were severely burned will be susceptible to weed invasion which may lower productive rangeland conditions in the long term.

Cumulative Effects

This alternative will not add project-related incremental effects to the effects of current or future grazing projects, because no management activities are proposed. Grazing, projects on private lands, and recreational activities will not adversely affect the availability of rangeland forage, and rangeland conditions will continue to fluctuate in response to climatic conditions, wildfire, and grazing management.

Alternatives 2, 3, and 4

The description of treatments for all alternatives are provided in chapter 2.

Salvage harvest, hazardous fuels treatment, roadside hazard treatments, and site preparation, planting, and release activities are planned as proposed treatments within the allotment boundaries. The alternatives maps and descriptions have been reviewed and the proposed activities will have minimal effects on rangeland resources because the proposed activities do not often overlap the same areas where cattle graze. Most salvage harvest and planting activities take place on steeper slopes which cattle rarely, if ever, use. Capable rangeland, or areas that are accessible to cattle and produce forage, are generally limited to a 40 percent or less slope during rangeland capability analysis on the Klamath National Forest (Holechek 1989; USDA Forest Service 2001). Project activities are also planned in timbered vegetative communities that are not likely to be able to produce substantial forage because of heavy canopy cover and lack of a seedbank.

Efforts will be taken to schedule grazing in areas that are not actively being treated so as to minimize stress to livestock and protect young seedlings. Permittees will be notified through Annual Operating Instructions of areas where harvesting, burning activity, and/or grazing restrictions will occur that could affect their permit. Additionally, Range project design features have been created to protect rangeland improvements such as cattle guards and corrals.

For a description of alternatives and a list of project design features, see table 2-1 of chapter 2. Alternatives 2, 3, and 4, are discussed together as they all have similar effects on rangeland resources. Acres of proposed activities within range allotments for alternative 2 are displayed in table 3-18 since this alternative proposed the greatest number of acres of treatment of any alternative.

Table 3-18: Approximate acres of proposed activities within allotment boundaries

Allotment Name	Fuels	Salvage Harvest Units	Roadside Hazard	Prep and Plant	Total
Dry Lake	2,102	859	1,921	1,481	6,363
East Beaver	922	12	756	0	1,690
Horse Creek	238	0	246	301	785
Lake Mountain	1,018	1,551	1,306	155	4,030
Middle Tompkins	482	1,172	2,423	1,178	5,255
Marble Valley	0	0	103		103
Etna Creek	228	20	48	0	296
South Russian	12	0	24	0	36
Grand Total (acres)	5,002	3,614	6,827	3,115	18,558

Many of the proposed activities overlap spatially so the footprint on the landscape will be less than the acres proposed under each individual treatment: this is displayed as the number of "dissolved" acres in table 3-19.

Table 3-19: Percentage of allotment acres treated under alternative 2

Allotment Name	Forest service acres within allotment	Total dissolved acres	Percentage of allotment acres being treated
Dry Lake	37,457	4860	13 %
East Beaver	41,607	1489	4 %
Horse Creek	23,224	558	2 %
Lake Mountain	9,655	3217	33 %
Middle Tompkins	14,736	4533	31 %
Marble Valley	8,136	103	1 %
Etna Creek	17,254	217	1 %
South Russian	12,277	34	0.3 %
Total	164,346	15,011	9 %

Only a small percentage of the East Beaver, Horse Creek, Marble Valley, Etna Creek, and South Russian allotments have acres proposed for treatments. This is largely due to the fact that only a portion of those allotments were burned, and what was burned, did not burn at high intensity. Additionally, the Marble Valley, Etna Creek, and South Russian allotments include wilderness areas which are not treated in any alternative.

Direct Effects and Indirect Effects

Where capable rangeland overlaps with salvage logging or fuels treatments, the project will likely provide new areas of transitory range. This will temporarily (5-10 years) increase the amount of forage available for livestock and wildlife, encourage animals to disperse on the landscape, and decrease grazing pressure on primary rangelands. Heavy equipment operations during treatment will likely increase the chance of weed dispersal; however, weed project design features (NNIS-1 through NNIS-5) will be in place and provide for proper mitigation. Livestock management will also be safer for permittees after hazardous trees have been removed. Rangeland conditions should not be negatively affected as a result of alternatives 2, 3 and 4, as a Range project design feature (Range-3) protects allotment meadows.

Cumulative Effects

Adding the effects of alternatives 2, 3, or 4 to the ongoing and reasonable foreseeable future actions identified in alternative 1 will not have substantial cumulative effects to range. There will be a slight increase of transitory range available for livestock and wildlife foraging and rangeland conditions will continue to fluctuate in response to climatic conditions, wildfire, and grazing management.

Alternative 5

Direct Effects and Indirect Effects

Direct and indirect effects of alternative 5 will be similar to alternatives 2, 3, and 4. Fewer acres will be available as transitory range as the proposed number of harvested acres is reduced by 75 percent in alternative 5 from that in alternative 2; however, the number of acres to be planted is only reduced by half. Overall, the condition of the range should remain relatively the same and forage will increase marginally when compared to alternative 2, 3, or 4. The same project design features as previously outlined in the direct and indirect effects of alternatives 2, 3 and 4 will be incorporated into alternative 5 to mitigate effects.

Cumulative Effects

Cumulative effects will be similar to those of alternatives 2, 3, and 4.

Comparison of Effects

Alternative 1 will have neutral effects to rangeland resources but will be more dangerous to permittees managing cattle in allotments as a result of no treatment activities. Alternative 5 will slightly increase forage availability and reduce hazards to permittees, as compared to alternative 1.

Alternatives 2, 3 and 4 will benefit rangeland resources the most as the treatments proposed will increase the amount of forage available, decrease grazing pressure on primary rangelands, and reduce hazards for permittees who maintain rangeland conditions.

Table 3-20: Comparison of alternatives for rangeland resources

Rangeland Indicator	Alternative 1	Alternatives 2, 3, and 4	Alternative 5

Rangeland Indicator	Alternative 1	Alternatives 2, 3, and 4	Alternative 5
Availability of Forage	No effect	Increase	Increase somewhat but less than alternatives 2, 3, or 4.
Rangeland Condition	neutral	neutral	neutral

Compliance with law, regulation, policy, and the Forest Plan

The project is in compliance with law, policy, and regulation related to rangeland resources, and is in compliance with the standards of the Forest Plan as displayed in the Forest Plan consistency checklist, available on the project website.

Water Quality

This section compares potential impacts and benefits to hydrologic function and water quality of project alternatives. Results of the analysis are used to verify that project alternatives adhere to existing law, regulation, and policy such as the Clean Water Act (specified by Total Maximum Daily Load requirements for the Klamath, Salmon, and Scott Rivers) and Forest Plan requirements including those related to the Aquatic Conservation Strategy.

Methodology

The effects of project alternatives on hydrologic function and water quality are analyzed based on existing Forest ecosystem analysis documents, recent watershed field surveys, and Geographic Information System (GIS) reports and modeling. Ongoing stream channel monitoring to meet North Coast Region Water Quality Control Board (Water Board) waiver requirements, and field surveys during and after the 2014 fires provided current data. Data were synthesized to define existing watershed conditions for comparison with Total Maximum Daily Load requirements for the Klamath, Salmon, and Scott Rivers, Aquatic Conservation Strategy objectives and desired watershed conditions from the Forest Plan.

The Forest uses standardized Cumulative Watershed Effects (CWE) models (Equivalent Roaded Area, Universal Soil Loss Equation, and mass-wasting) to assess effects of past, present, and reasonably foreseeable activities as described further in the body of the Hydrology resource report and relevant supporting references. Cumulative watershed effects models were used to index watershed disturbance (Equivalent Roaded Acres – ERA), evaluate the effects of soil erosion (Universal Soil Loss Equation – USLE) and evaluate the potential for mass-wasting (landsliding).

Models were updated to incorporate effects of the 2014 fires and road improvements identified in BAER assessments. The updates provide a picture of post-fire watershed conditions. The potentially ground-disturbing activities and events that are included in the CWE modeling for both US Forest Service lands and private lands in the project area are:

- Vegetation removal (timber harvest, thinning, fuels reduction);
- Roads used for temporary access;
- Log landing construction and enlargement;
- Effects of wildfires and suppression efforts (including fire lines);
- Prescribed burning;

- Road improvements (outsloping, rocking and crossing upgrades) (results shown as negative numbers); and
- Road decommissioning (results shown as negative numbers).

Ground-disturbing activities are assigned coefficients of disturbance in the Equivalent Roaded Area (ERA) model to represent the disturbance created by a road segment of equal size in area (Haskins 1986). Effects from vegetation management, wildfire, and prescribed fire show naturally reduced disturbance over time for all three models (ERA, universal soil loss equation (USLE) and mass-wasting (GEO)). Recovery curves are displayed in figures 1, 2 and 3 for the three models. Sediment yield (cubic yards/acre/year) estimated by the USLE occurs in the first winter season, requires a 2-year, 6-hour storm, and recovers to background rates within seven years (USDA Forest Service 2004). Sediment yield (cubic yards/acre/decade) estimated by the mass-wasting model depends on a ten-year storm event, and yield recovers to background rates in 50 years (USDA Forest Service 2004). The models make assumptions regarding the rates of recovery for the processes represented by the models. As site re-vegetation provides increased interception, evapotranspiration, ground cover, and mechanical strength, the effects of ground disturbing activities lessen (see figures 3-1, 3-2 and 3-3). Road and landing areas do not recover naturally over time; however, their coefficients of disturbance can be reduced if the areas are improved by decommissioning, outsloping, rocking, or crossing upgrades.

Model results fall on a continuum. The models are indexed using a “risk ratio.” The threshold of concern for the risk ratio for both models is 1.0. The threshold of concern does not represent the exact point at which adverse cumulative effects will occur. Rather it serves as a “yellow flag” indicating increasing susceptibility for adverse effects to beneficial uses in a watershed (Bell 2012).

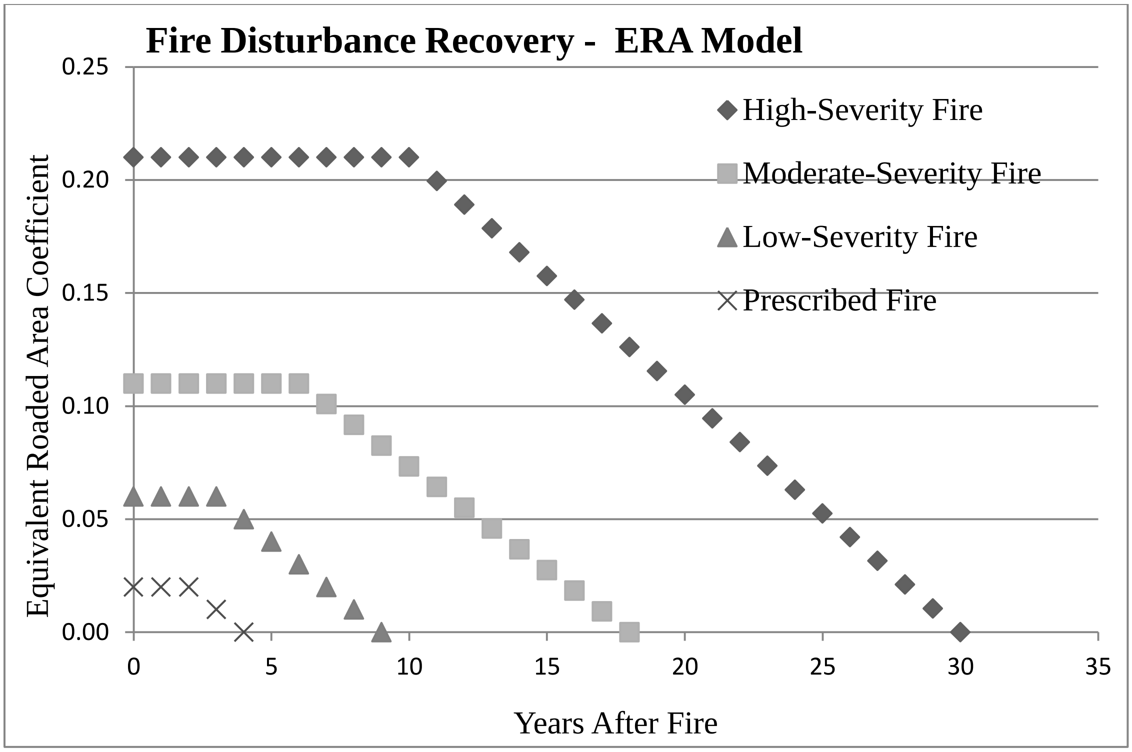


Figure 3-2: Fire disturbance recovery curves for the Forest cumulative watershed effects ERA model

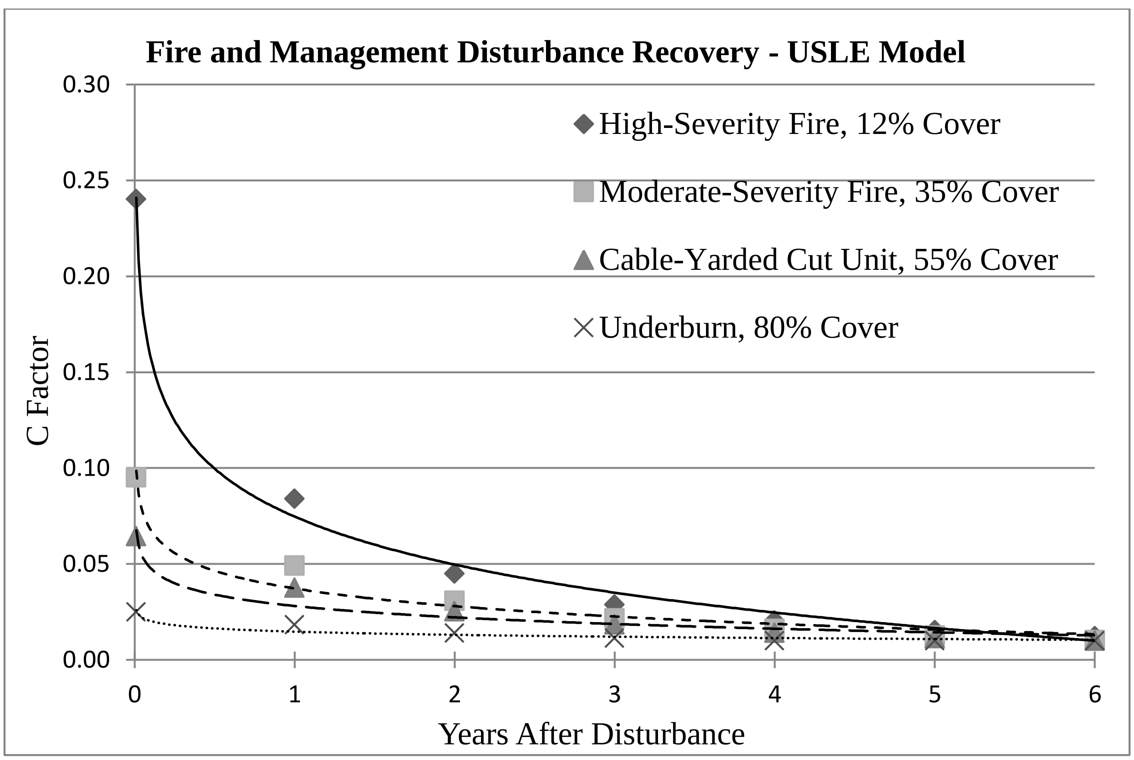


Figure 3-3: Fire and vegetation management recovery curves for the Forest cumulative watershed effects USLE model

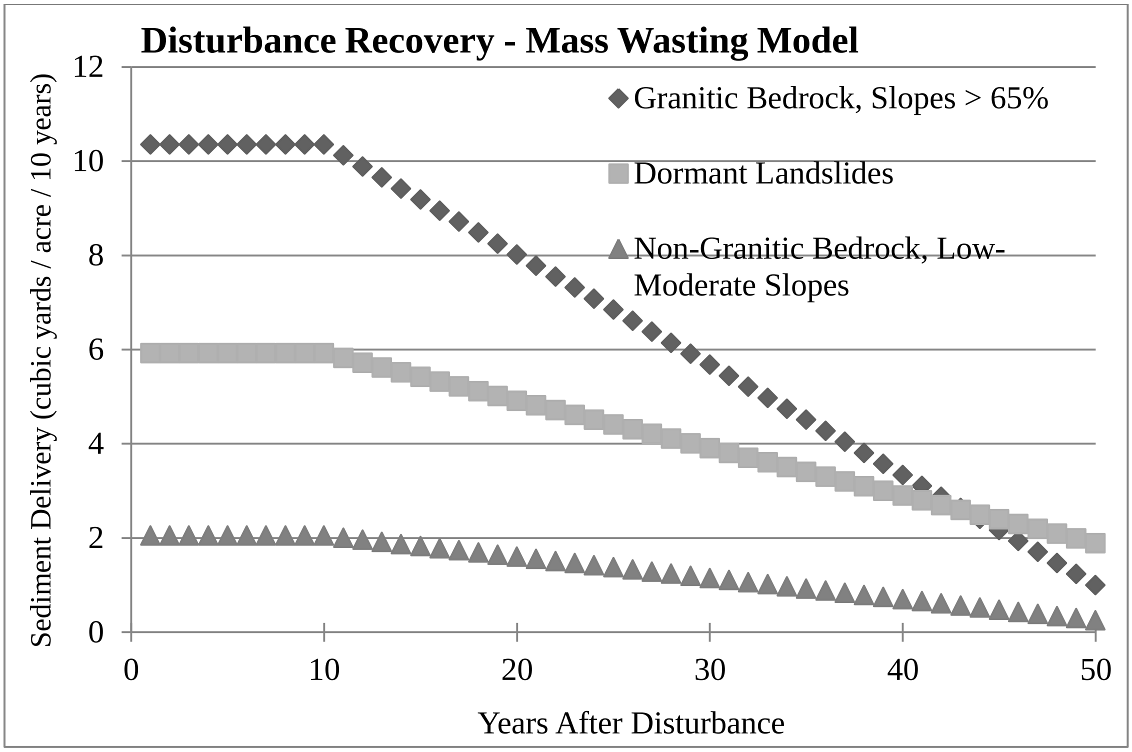


Figure 3-4: Recovery curves for the Forest cumulative watershed effects mass-wasting model

Analysis Indicators

Analysis indicators are chosen to be responsive to Total Maximum Daily Load (Clean Water Act) requirements and the Forest Plan (including Aquatic Conservation Strategy objectives), and to demonstrate potential differences between project alternatives with respect to hydrologic function and water quality.

Risk to Channel Morphology

The risk to channel morphology is analyzed using the ERA model. Watersheds with risk ratios of less than 1.0 are considered to have a low risk to channel morphology. Watersheds with risk ratios of between 1.0 and 1.5 have a moderate risk and watersheds with greater than 1.5 risk ratios have a high risk.

A low risk to channel morphology means that there is not likely to be a measurable change to peak flows and the channel bed, banks and floodplain will undergo natural modifications that are proportional to the storm events. A moderate risk indicates that peak flows may be artificially increased by the actions taken. The increased peak flow is likely to leave the channel susceptible to modifications that are slightly more than would occur under natural conditions. The perturbation of the geomorphic processes would be over the short term (about two to four years). A high risk to channel morphology means that the increase in peak flows would lead to undesirable changes (such as channel straightening and loss of coarse wood) that would require long-term recovery (greater than ten years).

Risk of Sediment Regime Alteration

The risk to water quality from sediment regime alteration is evaluated using the USLE and the mass-wasting model as described in the methodology section. Watersheds with a risk ratio for both models of less than 1.0 have a low risk of sediment regime alteration. Watersheds with at least the risk ratio between 1.0 and 1.5 of just one of the models have a moderate risk of sediment regime alteration. Watersheds with one model with risk ratios of greater than 1.5 and one greater than 1.0 have a high risk of sediment regime alteration.

A low risk means that water quality may be affected but the beneficial uses in the watershed are still occurring with nuisance interruptions in the natural processes. A moderate risk means that water quality is being affected and there are minor, short-term (2-4 years) interruptions to beneficial uses in the watershed. A high risk means that water quality is being affected on the long-term (greater than 10 years) and beneficial uses may be impaired. The effects of repairing or not repairing legacy sediment sites on the risk of erosion and sedimentation are also analyzed.

Risk of Temperature Regime Alteration

The risk to water quality from temperature regime alteration is assessed by analyzing effects to shade in Riparian Reserves. Vegetation burn severity data are used to assess effects of the 2014 fires on vegetation and related reduced shade as a baseline for the analysis of project activities. Riparian areas subject to moderate and high vegetation burn severity provide reduced shade relative to pre-fire conditions; shade protects water temperatures from solar insolation and warming. The effects of the project on shade are estimated by intersecting the treatment areas likely to remove live vegetation with Riparian Reserves. These areas are assumed to have the potential for shade loss. Shade will not be lost over much of the treatment area because the treatments focus on removal of only dead or small live trees. However, large live trees may be felled for safety. So the areas are considered to have the potential to loss stream shading. The landslide likelihood as assessed in the geology report is also used as a proxy for vegetation loss. Landslides can trigger debris flows which have been shown to remove vegetation along stream channels. Watersheds with less than 20% of the live vegetation affected by the fire or treatments in the project in the Riparian Reserves have a low risk of temperature regime alterations. Watersheds with between 20-50% live vegetation affected or a highly likely landslide likelihood have a moderate risk of temperature regime alteration. Watersheds with more than 50% of the live vegetation affected or an almost certain landslide likelihood have a high risk of temperature regime alterations.

A low risk means that the stream temperatures will remain within the range of natural variability. A moderate risk means that the stream temperatures will be affected on the short-term until shrubs and hardwoods re-sprout in the Riparian Reserve. A high risk means that the temperature will be measurably affected and it will take more than 10 years to recover.

Trend of Riparian Function

The trend of Riparian Function is analyzed at the project scale. It is intended to give an overall look at how the Riparian Reserves are functioning and whether the function is improving (positive trend), declining (negative trend) or staying the same (neutral trend).

The information from the indicators above is used to determine the magnitude and direction of the trend.

Spatial and Temporal Context

The spatial context for the hydrologic analysis is the project area that includes portions of the following eight 5th field watersheds: Beaver Creek; Humbug Creek-Klamath River; Horse Creek-Klamath River; Seiad Creek-Klamath River; Lower Scott River; Thompson Creek-Klamath River; Elk Creek; and North Fork Salmon River. The 5th field watersheds are the analysis area for *broad scale* effects analysis. The 7th field watersheds are considered *small scale* for a project area of this size. There are seventy-five 7th field watersheds that intersect portions of the three fire-related areas (Happy Camp Complex, Beaver, and Whites fires). In addition to the analysis of broad- and small-scale watersheds, the effects of proposed new infrastructure are analyzed. Effects to water quality of proposed temporary roads, stream crossings, and landings are assessed. The long-term temporal bounding for this analysis is up to 10 years because recovery of the fire-disturbed hydrologic function (from ERA modeling) and surface erosion (from USLE modeling) is appreciable in the first decade. The short-term is between 2 and 4 years after implementation.

Affected Environment

The analysis of the affected environment includes the Eddy Late Successional Reserve, Elk Thin, Fish Meadows, Glassups Timber Sale, Happy Camp Fire Protection Phase 2, Johnny O'Neil Late Successional Reserve Habitat Restoration and Fuels Reduction, Lake Mountain Foxtail Pine, Lower Scott Roads, North Fork Roads Storm-proofing, Oak Flat Thin, Singleton, Thom Seider Vegetation Management and Fuels Reduction, and Two Bit Vegetation Management projects, as well as the work done under the Burned Area Emergency Response, grazing allotments, Timber Harvest Plans since 2005, and private land salvage (under Emergency Timber Harvest Plans). These are on-going activities and the CWE model includes them in the "current" portion of the results. To remain consistent, all of these projects are included in the analysis of the affected environment, which represents the effects of the past and on-going actions.

General information on the affected environment for the project is provided in chapter 1. Watershed hydrology is characterized by dry summer and fall months followed by significant winter precipitation. Morphology and function of the steep stream channels is controlled by large floods such as those in 1997, 1974, 1964, and 1955 (Stewart and LaMarche 1967; de la Fuente and Elder 1998), and associated landslides and debris flows. Riparian vegetation is primarily hardwood (an example is shown in figure 4) although valley bottom mixed-conifer vegetation with large Douglas-fir trees was historically significant (Mondry 2004). While significant portions of the Walker Creek watershed burned at moderate and high severity in 2014, the main-stem valley bottom was mostly unburned. The steep main stem channel (≥ 3%) and predominantly even-aged hardwood riparian forest is typical of lower-gradient streams in the analysis area. This reach was surveyed and monitored by the USDA Forest Service Redwood Sciences Lab after significant disturbance from the 1997 flood.

Figure 3-5 : Walker Creek in the Happy Camp Complex Fire area (Photo by Zack Mondry 11/15/14).

Effects of the 2014 wildfires on existing conditions in the project area are greatest where forested areas burned with continuous high severity (see figure 3-5 for an example). Post-fire sediment has already been delivered to project areas streams such as Elk and Grider creeks during winter 2014-2015 storms (B. Miller, Klamath National Forest, written communication).

Figure 3-6: Effects of high-severity fire on a forested hillslope in Whites Gulch (Photo by Zack Mondry 11/26/14).

The current risk to channel morphology by 7th field watershed is displayed in the appendices of the hydrology report. There are sixty-three watersheds with a low risk and nine watersheds with a moderate risk. Doggett and Kohl Creek are the only two watersheds with a currently high risk to channel morphology. Their elevated risk is a result of the effects of the 2014 wildfire.

Currently there are five 7th field watersheds with a high risk of sediment regime alteration. These are Soda Creek-Beaver Creek, Lower West Fork Beaver Creek, Doggett Creek, McKinney Creek and Kohl Creek. All of the watersheds, except McKinney Creek, have elevated risks due to the effects of the 2014 wildfires. McKinney Creek has an elevated risk because of the current private land timber harvest activities. There are eighteen watersheds with moderate risks and 51 watersheds with a low risk of sediment regime alteration.

One cause of impairment to water and hydrologic function is legacy sediment sites from past management including historic mining, road building, and silviculture (Water Board 2010, Water Board 2005). A majority of the legacy sediment sites are associated with the road system, most of which was constructed prior to modern best management practices (BMPs). Culverts were commonly designed to pass a 25-year flood rather than the 100-year flood required by current road standards. Road construction often did not avoid unstable slopes or riparian areas that are protected by today's BMPs. As a result of these construction practices, some of the current road system is not resilient to natural disturbance by fire and floods. Some of the impact to water quality from the 1997 floods occurred when landslides and debris flows removed riparian vegetation, reduced stream shade, and increased water temperatures (De La Fuente and Elder 1998, Water Board

2010). The Total Maximum Daily Load requirements for the Klamath, Scott, and Salmon Rivers were developed to insure that road stream crossings withstand a 100-year flood without diverting or failing.

The Forest has completed legacy sediment site inventories for most roads on the Forest (USDA Forest Service 2012). The results of the analysis by 7th field watershed are in the appendices of the Hydrology resource report. A total of 953 legacy sediment sites were inventoried within the project boundary. The legacy sediment sites are associated with undersized culverts, stream diversion potential at road crossings, or roads located on unstable slopes. More detailed information on legacy sediment sites is provided in the Hydrology resource report.

There are currently eight watersheds with high risk of temperature regime alteration. These are Buckhorn Gulch-Beaver Creek, Kohl Creek, Lower Grider Creek, O'Neil Creek, Walker Creek, Caroline Creek, Granite Creek and Middle Elk Creek. All of these watersheds have elevated risk due to the 2014 wildfires. There are twenty-one and forty-five watersheds with a moderate and low risk respectively.

The trend of riparian function is currently a slowly climbing positive trend. The fire-killed trees will start to fall and add coarse wood to the riparian reserves which will create channel complexity. The increased landslide risk will both move coarse wood to the 3rd to 5th order streams but may also remove riparian vegetation that provides shade. The shade producing vegetation on small streams (including shrubs and hardwoods) recovers quickly; the shade on larger streams (large conifers required) will take longer to regenerate.

Environmental Consequences

Alternative 1

Direct Effects and Indirect Effects

There are no direct effects to channel morphology, water quality (sediment and temperature regimes), or channel function resulting from alternative 1. Recovery curves can be viewed as a timeline of the magnitude and duration of indirect effects on hydrologic function and hillslope sediment production of the 2014 wildfires and alternative 1.

Over the long-term, the fuel load conditions will lead to fire intensity and flame lengths that are conducive to major fire runs, crown fires, and spotting. The large fuels component (greater than 3 inches) will lead to an elevated fire intensity and duration of fire on the landscape if it should re-burn. In 10 years, the conditions under alternative 1 will lead to nine percent of the area having flame lengths greater than 11 feet. Sixty percent of the treatment area is likely to experience flame lengths between 4 and 11 feet and thirty-one percent is likely to have flame lengths of less than 4 feet. (See fire and fuels report). High flame lengths are associate with high severity fire and will contribute to accelerated sediment delivery(DeBano et al. 2005), increased stream temperatures (Pabst and Spies 2001)and stream flows (Neary, et al. 2005a)and increased potential for the introduction of toxic chemicals from fire retardant application during future fire suppression efforts(Neary, et al. 2005b).

Risk to Channel Morphology

Alternative 1 will allow for passive recovery of vegetation in the watersheds which will be slower than if treatment, including planting, would occur. The extended duration of decreased interception, use of water by plants, and ground cover will extend the risk to channel morphology over the long-term.

Risk of Sediment Regime Alteration

In the longer-term, legacy sediment sites will continue to have a high risk of failing in future floods and impacts will be similar to the channel scour, loss of stream shade, increased stream temperatures, and sedimentation that occurred in the 1997 flood as described by De La Fuente and Elder (1998). These impacts will adversely affect beneficial uses and violate the Waiver and water quality standards in the Basin Plan (State of California Water Board 2011). The risk of road failures is greater at sites located below high-severity burns due to increased runoff and peak flows.

The risk to sediment regime alteration will passively recover from current condition toward pre-fire conditions over the next four to five years for surface erosion. The recovery for landslide-related sediment will start in about 10 years and could take up to 80 years to be reduced to pre-fire levels because of the length of time required to re-establish forest vegetation without artificial regeneration (see Geology report).

Risk of Temperature Regime Alteration

The watersheds with a high risk of temperature regime alterations, without artificial regeneration, will have an extended duration of elevated risk. Natural regeneration will occur, but in general it will more than 80 years to get trees with 10 inch diameters at breast height in areas burned with high and moderate severity (personal communication, Project Silviculturist).

Trend of Riparian Function

Large-wood loading to riparian zones and stream channels that is expected to occur under this alternative is widely regarded as beneficial for sediment retention, channel function, habitat complexity, cover, and nutrient cycling (Keller and Swanson 1979; Nakamura and Swanson 1994; Grant and Swanson 1995). Given the relatively small acreage of Riparian Reserve that burned at moderate- and high-severity in 2014, and the small length of stream channels affected, negative fire effects are not expected to channel function resulting from burned Riparian Reserve areas. Where fire impacts increase large wood loading to stream channels, effects will be positive for channel sediment metering and other functions. However, the elevated likelihood of landsliding (see geology report) will take more than 80 years to recover under alternative 1. Debris flows can have substantial effects on channel function. The overall trend of riparian function is positive but has a gentle slope (long-term recovery).

Cumulative Effects

The projects added to the effects of the past actions (the affected environment) and the direct and indirect effects of the project are portions of the Jess project, Salmon Reforestation, Scott Bar Underburn, Lovers Canyon, McCollins and Sawyers Bar Fuels Reduction Project that are in the 7th field watersheds analyzed. The Jess project and

Lovers Canyon project are the only two future projects that have any effect on risk ratios or number of watersheds with high or moderate disturbance.

Risk to Channel Morphology

One watershed, Jessups Gulch, moves from a low risk to a moderate risk. The cumulative elevation in risk is a result of the Jess project. These effects will be mitigated via project design features but the risk will likely remain moderate. All other watersheds remain the same as in the affected environment. Cumulatively the number of watersheds with a low risk to channel morphology is sixty-two. The number of watersheds with a moderate risk goes from nine to ten and high risk remains at two.

Risk of Sediment Regime Alteration

There is no change in any of the risk categories for any of the 7th field watershed. The risk ratios increase by an average of 0.02 which results in no change of average risk ratio when reported to a single decimal place. The largest increase was in Jessups Gulch where the USLE and mass-wasting risk ratios increase by a value of 0.2 due to the effects of the Jess project. The risk of sediment regime alterations for Jessups Gulch remains low when cumulative effects are considered.

Risk of Temperature Regime Alteration

The cumulative effects for risk to temperature regime alterations made the assumption that there would be no loss of shade on streams from Forest Service projects because of the Total Maximum Daily Load requirements. It was assumed that there is a loss of shade for all private land harvests including private land salvage of 2014 fire areas. There is no change in the risk levels for any of the watersheds as a result of adding the actions considered in this portion of the analysis to the project effects. There were increases in the percent of the Riparian Reserves with the potential to lose shade, but none of the changes were large enough to increase the risk category.

Trend of Riparian Function

Riparian Reserve function will continue on a slow, positive trend. There may be a slight downward dip in riparian function in watersheds with private land harvest due to the loss of shade in the stream channels. This will be a short-term cumulative effect on the smaller streams as shrubs and hardwoods can provide shade, however on the main stems the downward trend will be more long-term until large conifers are shading the stream again.

Alternative 2

Direct Effects and Indirect Effects

The fire severity will remain low for 10 years post-treatment for all areas treated in the alternative. If the area should re-burn during this time, the risk to water quality will be small and short-term.

Risk to Channel Morphology

There will be sixty-three 7th field watersheds that will continue to have a low risk to channel morphology, nine watersheds that will continue to have a moderate risk, and two with a high risk. Alternative 2 proposes construction or reconstruction of temporary roads, installation and removal of stream crossings, and construction of log landings in

Riparian Reserves. While effects of these activities on channel morphology is minor to undetectable at the watershed scale, site-scale effects are anticipated from some infrastructure. These temporary road actions include 14 stream crossings (four of perennial streams and 10 of intermittent streams). Temporary stream crossings will likely have short duration effects to water quality due to sediment production during in-channel actions and in the first winter after use; they will likely be small-scale and limited to the immediate downstream channel reach, depending on flow regime and channel morphology. Further detail on site-scale effects is provided in the Hydrology and Aquatic resources reports. The project design features (table 2-35 in chapter 2) are not accounted for in the modeling and are intended mitigate effects including surface runoff from temporary roads and landings which can exacerbate peak flows.

Risk of Sediment Regime Alteration

The effects of alternative 2 do not change the risk categories for any watershed compared to alternative 1. The USLE model increases for nine watersheds and the mass-wasting model increase for seventeen watersheds. The risk ratio increase is less than 0.2 in all cases. The changes in the risk ratios are not enough to change the risk category for any of the watersheds. The treatment of legacy sites in the Elk Creek 6th field watershed will reduce the chronic sediment delivery to stream channels. Site-scale alteration of the sediment regime is anticipated in some cases as described in the Hydrology and Aquatic resources reports.

Risk of Temperature Regime Alteration

The effects to risk of temperature regime alterations assumed that the only action that would remove shade on streams would be roadside hazard treatments. There is no treatment in the Riparian Reserves in the salvage units and site preparation and fuels treatments are only removing dead vegetation. The indirect effect of alternative 2 leads to nine watersheds having high risk, one more than alternative 1. Robinson Gulch moved from moderate risk under alternative 1 to high risk for alternative 2. There are also ten watersheds that move from a low risk under alternative 1 to a moderate risk under alternative 2. These are Miller Gulch-Klamath River, Upper Grider Creek, Tom Martin Creek, Horse Creek-Klamath River, Headwaters of Elk Creek, Upper Elk Creek, Lower East Fork Elk Creek, Hoop & Devil, Lower South Russian Creek and Big Creek. The numbers of watersheds with low and moderate risk are 35 and 30, respectively.

Trend of Riparian Function

The Riparian Reserve function will have a positive trend. The trend will be for a little faster recovery due to planting of burned stands in Riparian Reserves that will increase the speed of reforestation. There is limited removal of large trees from the Riparian Reserves so coarse wood is not likely to be measurably reduced on the watershed scale. The landslide likelihood remains the same as for alternative 1. However, the duration of the elevated risk is reduced for some of the most at risk watersheds (see Geology report).

Cumulative Effects

Risk to Channel Morphology

The actions considered for cumulative effects are the same as for alternative 1. The cumulative effect on risk to channel morphology is that Jessups Gulch will move from a low risk to a high risk. These effects will be mitigated via project design features but the risk will likely remain moderate. All other watersheds remain at the same risk level as for the indirect effects of alternative 2.

Risk of Sediment Regime Alteration

Thirteen of the watersheds had an increase in the risk ratio for USLE and three for the mass-wasting model as a result of future foreseeable actions but no increase was large enough to change a risk category. The largest increase in USLE risk ratio was in Jessups Gulch (0.2). The largest increase in the mass-wasting risk ratio was also in Jessups Gulch (0.2). The risk ratio is reduced due to the legacy site treatments in seven and six watersheds for the USLE and mass-wasting model, respectively.

Risk of Temperature Regime Alteration

The actions considered in cumulative effects increased the shade loss potential for 19 watersheds. Big Ferry-Swanson has an increase in percentage of the watershed with shade loss potential of 12.4%, Quigley’s Cove has an increase of 8.6%, Doggett Creek of 7.6% and Dutch Creek of 6.7%. The other watersheds have increases of less than 3%. These increases are not enough to move any of the watersheds into another risk category.

Trend of Riparian Function

The trend of the Riparian Reserve function will remain positive. There may be a slight downward dip in riparian function in watersheds with private land harvest due to the loss of shade in the stream channels. This will be a short-term cumulative effect on the smaller streams as shrubs and hardwoods can provide shade, however along main stems, the downward trend will be longer-term until large conifers are shading streams again.

Alternative 3

Direct Effects and Indirect Effects

The fire severity will remain low for 10 years post-treatment for all areas treated in the alternative. If the area should re-burn during this time, the risk to water quality will be small and short-term.

Risk to Channel Morphology

The risk to channel morphology for all watersheds for alternative 3 is the same as for alternative 2.

Risk of Sediment Regime Alteration

The risk of sediment regime alterations is the same as for alternative 2. The mass-wasting risk ratios for eight watersheds were reduced slightly but not enough to change the risk categories for any of the watersheds. Site-scale alteration of the sediment regime is anticipated in some cases as described in the Hydrology and Aquatic resources reports.

Risk of Temperature Regime Alteration

The risk of temperature regime alterations is the same as for alternative 2.

Trend of Riparian Function

The trend of riparian function is the same as for alternative 2.

Cumulative Effects

Risk to Channel Morphology

The cumulative effects for risk to channel geomorphology for all watersheds for alternative 3 are the same as for alternative 2. The increases to the risk ratios from actions considered for cumulative effects are the same as for alternative 2.

Risk of Sediment Regime Alteration

The cumulative effects for risk of sediment regime alteration for all watersheds for alternative 3 are the same as for alternative 2. The increases to the risk ratios from actions considered for cumulative effects are the same as for alternative 2.

Risk of Temperature Regime Alteration

The cumulative effects on risk of temperature regime alterations are the same as for Alternative 2.

Trend of Riparian Function

The cumulative trend of riparian function is the same as for alternative 2.

Alternative 4

Direct Effects and Indirect Effects

The fire severity will remain low for 10 years post-treatment for all areas treated in the alternative. If the area should re-burn during this time, the risk to water quality will be small and short-term.

Risk to Channel Morphology

The risk to channel morphology for all watersheds for alternative 4 is the same as for alternative 2. Fifteen watersheds have risk ratios less than for alternative 2. However, none of the risk ratios decreased enough to reduce the risk categories.

Risk of Sediment Regime Alteration

The risk of sediment regime alterations is the same as for alternative 2. The USLE risk ratios for six watersheds are reduced and mass-wasting risk ratios for six watersheds are reduced but not enough t0 change the risk categories for any of the watersheds. Site-scale alteration of the sediment regime is less for alternative 4 than for alternatives 2 and 3 due to reduced miles of proposed temporary roads and no stream crossings as described in the Hydrology and Aquatic resources reports.

Risk of Temperature Regime Alteration

The risk of temperature regime alteration is the same as for alternative 2. However, the reduction in roadside treatments reduced the percent potential shade reduction in fourteen watersheds. Lower West Fork Beaver, Dutch Creek, Middle Creek, Deep Creek, and Horse Creek had potential shade-loss reduced by 1.1%, 1.8%, 2.7%, 1.3% and 3.1%, respectively. In the remaining watersheds, reductions were less than 1%. None of these reductions were enough to reduce risk categories.

Trend of Riparian Function

The trend of riparian function is the same as for alternative 2 with the exception of site-scale effects that are smaller for alternative 4 than for alternatives 2 and 3.

Cumulative Effects

Risk to Channel Morphology

The cumulative effects for risk to channel geomorphology for all watersheds for alternative 4 are the same as for alternative 2. The increases to the risk ratios from actions considered for cumulative effects are the same as for alternative 2.

Risk of Sediment Regime Alteration

The cumulative effects for risk of sediment regime alteration for all watersheds for alternative 3 are the same as for alternative 2. The increases to the risk ratios from actions considered for cumulative effects are the same as for alternative 2.

Risk of Temperature Regime Alteration

The cumulative effects are the same as for Alternative 2. The relative increases in the potential shade loss were the same as for alternative 2. None of the watershed risks were reduced compared to alternative 2.

Trend of Riparian Function

The cumulative trend of riparian function is the same as for alternative 2.

Alternative 5

Direct Effects and Indirect Effects

The fire severity will remain low for 10 years post-treatment for all areas treated in the alternative. If the area should re-burn during this time, the risk to water quality will be small and short-term.

Risk to Channel Morphology

The risk to channel morphology for all watersheds for alternative 5 is the same as for alternative 2. Seventeen watersheds have risk ratios less than for alternative 2; however the changes are not enough to change the risk category for any of the watersheds.

Risk of Sediment Regime Alteration

The risk of sediment regime alterations is the same as for alternative 2. The mass-wasting risk ratios for nine watersheds were reduced but not enough to change the risk categories for any of the watersheds. Site-scale alteration of the sediment regime is less for alternative 5 than for alternatives 2 and 3 due to the reduced miles of proposed temporary roads and no stream crossings as described in the Hydrology and Aquatic resources reports.

Risk of Temperature Regime Alteration

The risk of temperature regime alterations is the same as for alternative 2.

Trend of Riparian Function

The trend of riparian function is the same as for alternative 2.

Cumulative Effects

Risk to Channel Morphology

The cumulative effects for risk to channel geomorphology for all watersheds for alternative 5 are the same as for alternative 2. The increases to the risk ratios from actions considered for cumulative effects are the same as for alternative 2.

Risk of Sediment Regime Alteration

The cumulative effects for risk of sediment regime alteration for all watersheds for alternative 5 are the same as for alternative 2. The increases to the risk ratios from actions considered for cumulative effects are the same as for alternative 2.

Risk of Temperature Regime Alteration

The cumulative effects on risk of temperature regime alterations are the same as for alternative 2.

Trend of Riparian Function

The cumulative trend of riparian function is the same as for alternative 2.

Comparison of Effects

The CWE model results by 7th field watershed for direct and indirect effects, and for cumulative effects, for analysis indicators are in the appendices of the hydrology report. A comparative summary of the effects of alternatives on analysis indicators for water (hydrology) is displayed in table 1.

Table 3-21: Number of 7th field watersheds in each risk category for analysis indicators

Indicator	Ranking	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Channel Morphology	Low	63	63	63	63	63
	Moderate	9	9	9	9	9
	High	2	2	2	2	2
Risk to Sediment Regimes	Low	51	51	51	51	51
	Moderate	18	18	18	18	18
	High	5	5	5	5	5
Risk to Temperature Regimes	Low	45	35	35	35	35
	Moderate	21	30	30	30	30
	High	8	9	9	9	9
Trend of Riparian Function		Very Slow, Positive	Slow, Positive	Slow, Positive	Slow, Positive	Slow, Positive

Aquatic Resources (includes fisheries)

This section describes the environment for aquatic resources in the analysis area and discloses the effects to these resources.

Methodology

Analysis is based on three components: (1) a review of existing information for streams in the analysis area; (2) post-fire field review of proposed treatment units, Riparian Reserves and stream channels; and (3) a review of best available information related to aquatic resources present and potential impacts of the various actions proposed. Existing information came from the Forest Plan, watershed analyses conducted by the Forest, existing stream survey data and reports, and other environmental analyses completed for projects within the analysis area. These sources provide information on watershed histories and land uses, aquatic species distribution and habitat use within the analysis area, and aquatic habitat conditions.

The analysis area 5^{th} field and 7^{th} field watersheds provide habitat for the special status aquatic species listed under analysis indicators.

Analysis Indicators

Threatened and Endangered Species/Forest Service Sensitive Species

There are no endangered species in the analysis area and the Southern Oregon/Northern California Coast (SONCC) Coho Salmon is the only threatened species; critical habitat has been identified for SONCC Coho Salmon. Three key habitat indicators from the *Analytical Process for Developing Biological Assessments for Federal Actions Affecting Fish within the Northwest Forest Plan Area* (USDA-USDOC-USDI 2004) are used for the analysis of effects to Coho Salmon. This allows standardization of evaluations of actions and effects for conferencing/consultations under Section (§) 7(a)(2) of the ESA. The same analysis indicators are used to evaluate effects on Forest Service sensitive species: Upper Klamath-Trinity River (UKT) Chinook Salmon; Klamath Mountains Province (KMP) steelhead; Pacific lamprey; Klamath River lamprey; southern torrent salamander; foothill yellow-legged frog; cascade frog; and western pond turtle. These indicators are: water temperature; sediment (fine sediment in substrates and substrate embeddedness); and large wood. Essential fish habitat (EFH) has been determined for the SONCC Coho Salmon and the UKT Chinook Salmon as required by the Magnuson-Stevens Fishery Conservation and Management Act; effects on EFH are also measured by effects on these indicators.

Management Indicator Species

Management indicator species associations are identified in the Forest Plan as associations that may be affected by management activities. Analysis of effects of actions on these associations involves examining the impacts of the project on habitat associations for management indicator species. Species associations related to aquatic species are the river/stream association and the marsh/lake/pond association. For this analysis, the following analysis indicators will be used to determine the level of effects for each habitat association.

River/Stream Associated Species (steelhead, resident rainbow trout, tailed frog, and cascades frog:

Change in Water Quality (WQ), physical barriers, substrate, refugia, stream-bank condition, disturbance history/regime, flows, drainage network, and Riparian Reserves.

Aquatic species included in this association are steelhead and resident trout, tailed frog, and Cascades frog. For purposes of the management indicator species association analysis, river/stream habitat is degraded where the project may result in impacts to the near stream environment, water quality, and/or aquatic habitat to the point that the quality of the habitat is lessened. River/stream habitat is removed if the habitat is affected by the project such that it is no longer suitable habitat for the indicator species.

Marsh/Lake/Pond Associated Species (western pond turtle):

Change in low gradient, open water habitat quality, including streamside vegetation and large wood.

Western pond turtle is the only species analyzed for this association. The analysis of this habitat association is the same as for river/stream associated species except with an emphasis on perennial low gradient streams, ponds and other lentic waterbodies.

Spatial and Temporal Context

The aquatic resources analysis area is comprised of the 5th field watersheds and their 7th field drainages that were affected by the 2014 fires and in which activities are proposed for this project (see list of these watersheds in chapter 1).

The temporal bounding of the analysis includes effects during implementation, short-term effects expected to occur within the first year following implementation, and long-term effects (greater than one year).

Affected Environment

The affected environment describes the 5th field watersheds in the 2014 burned areas, the special status aquatic resources that are likely to be present, and the pre-project condition of the key indicators of habitat quality for aquatic species (temperature, sediment, and large wood).

Table S-1 displays the miles of stream that were affected by moderate or high severity fire in 2014 (43 miles of perennial and 124 miles of intermittent streams). Due to the nature of fire salvage, project actions and effects are likely within or near streams that were affected by the fires. Within the riparian areas that were heavily affected by moderate and high severity effects from the fires, riparian and aquatic habitat are currently degraded in terms of loss of shade/canopy cover and soil cover, as well as potential for hydrophobic soils in areas that burned hot (see the Soil section of this chapter and the Soil resource report). These changes led to a reduced capacity of the riparian area to provide shade and cover for aquatic organisms and to reduced capacity to slow overland flow and filter out sediment before it reaches stream channels.

Threatened and Endangered Species/Forest Service Sensitive Species

Habitat is present in the analysis area for the threatened SONCC Coho Salmon, and for all Forest Service sensitive species identified in the analysis indicators discussion. Foothill yellow-legged frog and Western pond turtle are known to occur in the Klamath River, Scott River, and North Fork Salmon River; they are assumed to occur in all relatively low gradient and low elevation slow water habitat (mostly restricted to the Klamath River and a few larger tributaries such as sections of Beaver Creek for the yellow-legged frog with turtles occurring in a wider range of habitats). Cascade frogs have been observed at Wilderness lakes that comprise the headwaters of several analysis-area streams (Elk Creek, Kelsey Creek, Canyon Creek, and South Russian Creek). Cascade frogs are assumed to occur in the project area within, or near, stream and lake habitat above 2,500 feet. Most of the Forest (including the analysis area) is outside the expected distribution of Southern Torrent salamander; this species occurs in or very near coastal streams to the west of the Forest. It is not likely that Southern torrent salamanders occur in the project area but, since presence cannot be ruled out, it is assumed that they may occur in suitable stream habitat only in the western-most parts of the Happy Camp Ranger District (Elk Creek for this analysis).

Special status aquatic species occur within suitable aquatic habitat that, in general, would be described as properly functioning stream and/or lake ecosystems with high water quality, substrate character, and large woody material; all of these interact to create or maintain important aquatic habitat components such as streamside cover, relatively stable water temperatures, deep pools, and suitable reproductive habitat.

Management Indicator Species

River/Stream Associated Species

High quality riparian and aquatic habitat abundance

The project area contains about 802 miles of perennial stream habitat and 1,012 miles of intermittent stream habitat. Resident trout occur in approximately 338 miles of stream in the project area drainages and steelhead in approximately 224 miles. Cascades frogs may occur in about 314 miles of stream in project area drainages and tailed frogs may occur throughout all perennial streams in the project area.

It is reasonable to assume that high quality riparian and aquatic habitat does not currently occur in areas of moderate/high fire intensity, and aquatic habitat in streams downstream of these areas is likely also experiencing negative effects such as increases in sedimentation, water temperature and peak flow events. These areas will recover over a range of time frames, dependent upon local site conditions and weather. Along stream reaches that were not impacted by the 2014 fires, riparian and aquatic habitats within project area streams are generally of high quality as management actions are restricted as described in the Forest Plan and Aquatic Conservation Strategy.

Marsh/Lake/Pond Associated Species

High quality, low gradient open water habitat abundance

The project area contains about 802 miles of this stream habitat and 362 acres of lentic habitat that defines this species association. The quality or condition of this habitat association was not heavily impacted by the 2014 wildfires as relatively few miles of low gradient perennial streamsides on the Klamath, Scott, and North Fork Salmon River burned at moderate or high severity. Riparian habitat near lakes was also mostly unaffected by the 2014 fires.

Water quality in the Klamath River, Scott River, and North Fork Salmon River is listed as impaired and is on the 303(d) Clean Water Act list as noted in the Hydrology section of this chapter and related resource report. Following is a summary of existing conditions in the analysis area as it relates to the key habitat indicators used for this analysis (temperature, sediment, and large wood).

Stream Temperature

Use of mainstem habitat by aquatic species is the most limited by water quality during the summer months (June through September) when water temperatures are high throughout the day. Juvenile fish must use tributaries and other off-channel areas where cooler water can be found. In general, mainstem habitat in these rivers is not suitable for productive summer or winter rearing, making tributary habitats highly valuable for growth and survival of Coho Salmon (NMFS and USFWS 2013).

The percent of stream channels burned is an indication of how stream shade was directly affected by 2014 wildfires.

Table 3-22: Summary of stream channel burn severity data from BAER Reports (USFS 2014a-2014f) for the 2014 fires.

Fire Area	Stream Type	Moderate miles (%)	High miles (%)	Total (miles)
Beaver Fire	Intermittent	37 (28%)	10 (8%)	47
	Perennial	5 (14%)	<1 (0%)	5
Happy Camp Complex	Intermittent	50 (18%)	2 (1%)	52
	Perennial	27 (11%)	<1 (0%)	27
Whites Complex	Intermittent	21 (24%)	4 (5%)	25
	Perennial	9 (14%)	2 (3%)	11
TOTAL (miles)	Intermittent	108	16	124
	Perennial	41	2	43

Sediment

Habitat for special status aquatic species is dependent upon watershed processes like natural sediment supply and sorting. Access to tributary rearing habitat and refugia for salmonids during parts of the summer is blocked by alluvial barriers. Soils in these areas are highly erodible, and in combination with the steep terrain, recent intense fires, and a legacy of past timber harvest and road-building, fine sediment loading has contributed to impaired conditions throughout the Middle Klamath (see the Hydrology and Soil sections of this chapter and resource reports, including the Aquatic Species resource report, for more detailed information).

Large Wood

Current levels of large woody debris across streams in the analysis area are generally considered “at risk.” Large wood was removed from many streams on the Forest in the 1960’s and 1970’s with the intent of preventing damage to downstream infrastructure. Floods (1964 and 1997) removed shallow-rooted vegetation such as alders, and debris flows delivered large wood to mainstem channels in some areas (Elk Creek). Many riparian areas along the Middle Klamath and North Fork Salmon River remain partially barren as a result of historic placer and hydraulic mining activities, and lower hillslope road construction that disconnected the river from its floodplain.

Aerial photos show that while there are areas of disturbance, the majority of riparian areas surrounding tributaries and high quality refugia for salmonids contain abundant riparian vegetation and have adequate structure and diversity. The percent of stream channels burned in 2014 (table 3-21) provides an indication of current and near-term instream large wood conditions.

Environmental Consequences

Because aquatic species of special concern have some overlapping habitat requirements, potential project impacts to their habitat (indirect effects) are discussed together using key habitat indicators that reflect the quantity and quality of suitable habitat for these species pre- and post-project.

Alternative 1

Threatened/Endangered and Forest Service Sensitive Species

Direct Effects

Under alternative 1, there would be no action taken to meet the purpose and need for the project and desired future conditions within the project area (see chapter 1).

This alternative is not a baseline condition, but rather a description of future circumstances without implementation of the project. This alternative is a continuation of the current level of management including road maintenance, hazard tree removal, dispersed recreation, mining, watershed restoration, appropriate management and fire suppression against the back-drop of about 160,000 acres of Forest lands in the project area that burned in 2014. No direct effects will occur under this alternative since no activities will be implemented as a result of the project.

Indirect Effects

For the sediment and temperature indicators, watershed conditions will recover over time from the impacts of the 2014 fires. In the moderate and high burn severity areas surrounding stream channels, an increase in large wood loading is expected in the near term from falling snags, and a reduction in large wood available for recruitment is expected over the long-term unless and until these areas naturally recover with large conifers.

Salvage Harvest and Reforestation

Alternative 1 will not remove burned trees or help to restore forests including in moderate and high fire intensity areas. Without salvage, site preparation and replanting, severely burned stands (such as in Walker Creek) will likely be replaced by shrubland (Skinner et al. 2006, page 174) and restoration to conifer stands may take decades or even longer. Planting without site preparation would likely result in the loss in conifer plantations before they mature given the median five to 25-year fire return interval predicted within the analysis area. Failing to salvage and reforest moderate to high severity stands in subsequent years increases the potential for a future wildfire to spread and cause adverse impacts to Riparian Reserves (including Sediment, Stream Temperature and Large Wood) because it will be unsafe to fight the fire directly. This alternative can indirectly affect sediment regimes in the analysis area when a future wildfire occurs because there will be an increased potential for severe fire effects if fuels are not reduced and because the abundance of burned trees within the fire areas will make fire suppression difficult if not impossible. With this alternative, short-term negative impacts of post-fire salvage logging on aquatic resources will be eliminated.

Fuels Reduction

Immediate post-fire conditions in the analysis include reduced surface fuel loading across the landscape. Thus, over the next one to five years, if a fire occurs there is a low potential for fire spread and fire intensity that would add to the ongoing watershed impacts to aquatic species and their habitat. Fire suppression would be effective in containing new fire ignitions. Within five to ten years, the potential for a future wildfire to spread and cause adverse impacts to watershed processes and fish habitat increases. Within moderate to high severity burn areas, enormous amounts dead trees will remain standing and some will fall, creating high fuel loads across the burned landscape. If a fire does not occur within this time, these areas will likely be covered with shrubs and dead and down snags, making the area susceptible to high severity fire. Where stand-replacing fire intensity occurs on hillslopes and in streamside zones, adverse impacts to habitat indicators and aquatic species are expected to be negligible in the short-term (due to current low surface fuel loading) and moderate or more sizeable when/if the next wildfire occurs.

Hazard Tree Abatement

Hazard tree reduction as described for this project will not occur under this alternative. Hazard tree removal will continue where it is part of ongoing actions, or where proposed in future projects.

Temporary Roads, Landings and Water Drafting

Since no project activities, including construction of temporary roads and landings or water drafting, will occur under this alternative, there will be no effects on habitat indicators or aquatic species associated with these activities. With alternatives 2, 3, and 5 there are several sites (along tributaries of Doggett and Grider) where project temporary road actions involve using roads that currently have legacy sediment sites, or areas that are at risk of erosion (and therefore a threat to water quality) due to past land use. When/if the project uses these roads they will be hydrologically stabilized and any active erosion, or risk of erosion will be addressed. For the drainages where this would occur with the action alternatives, the opportunity to improve/protect water quality would be foregone with alternative 1.

Legacy Sites

None of the treatments to address roughly 150 legacy sediment sites in the Elk Creek watershed will occur in this alternative; there will be no treatment to address undersized culverts, diversion potential, fill removal on abandoned roads, or aquatic organism passage. Also, road storm-proofing treatments on about 33 miles of system road in the Elk Creek watershed will not be covered by this alternative.

Cumulative Effects

Alternative 1 will not add project-related direct effects to the effects of past, present/ongoing or future projects because no management activities are proposed.

There will be minimal impacts on aquatic species from reasonable foreseeable future actions in other projects. Where there is spatial or temporal overlap of projects currently undergoing implementation, they have already been accounted for in the existing environment. Where future actions do overlap with the project, cumulative effects will be minor because adding the indirect effects of alternative 1 to the effects of other projects is not expected to cumulatively produce measurable effects to aquatic species.

Management Indicator Species

Direct Effects

Because there would be no action taken, there would be no direct effects.

Indirect Effects

An important indirect effect of the alternative 1, relative to riparian and aquatic resources, is the missed opportunity for the legacy site treatments included in all of the action alternatives.

Failing to salvage and reforest moderate to high severity stands that were burned in 2014 would have no effect on stream temperature, sediment, or large wood over the next one to five years as postfire conditions include reduced surface fuel loading across the landscape. From five to10 years out, failing to salvage and reforest moderate to high severity stands, and conduct fuels treatments, increases the potential for a wildfire that spreads and is likely to cause adverse impacts to Riparian Reserves and aquatic habitat. As large trees fall and brush accumulates, it becomes more unsafe to fight fires directly and, therefore, fires are likely to burn across more drainages causing more negative effects to aquatic habitat.

Cumulative Effects

Cumulative effects to management indicator species associations are similar to the cumulative effects to threatened and Forest Service sensitive species.

Alternative 2

Threatened/Endangered and Forest Service Sensitive Species

Direct Effects

The potential for direct effects to aquatic resources is associated with actions that occur in active stream channels. All action alternatives are the same with respect to potential direct effects to aquatic resources because all action alternatives include water drafting and crossing upgrades part of legacy sediment site treatment, which are the only actions proposed within active stream channels. Several temporary stream crossings will be required as part of temporary road actions; these crossings are outside/above fish habitat therefore effects to habitat and species associated with temporary stream channel crossings are disclosed below under indirect effects. Project design features described in chapter 2 control the manner in which project-related water drafting will occur. Specifically, the project design feature Watershed-35 does not allow for any improvement or modification of water drafting sites within Coho Salmon critical habitat and it requires that Forest Service fisheries biologists help to approve water drafting locations so as to minimize potential impacts to thermal refugia. By adhering to NOAA (2001) water drafting specifications, Forest Best Management Practices, and the project design feature (Watershed-38) specifically developed to restrict modification of drafting sites within Coho Salmon critical habitat and ensure that thermal refugia are protected, effects of water drafting on fish are likely to be discountable. It is expected that if there are aquatic species in the vicinity of drafting sites, they will move out of the area temporarily when a truck approaches. Due to inclusion of protection measures, water drafting is likely to have only minor short-term direct effects on aquatic species or their habitat, with no long-term effects.

Legacy sediment site repair will be implemented including design features to minimize or eliminate negative effects to aquatic species. Specific requirements designed to protect aquatic species during legacy site repair include project design features Watershed-18, Watershed-19, Watershed-20, and Watershed-21 (table 2-35 of chapter 2). Culvert upgrades, including three culverts that will be upgraded with an open bottom arch structure, require work within a stream channel. None of these actions will occur within Coho Salmon critical habitat, and all are greater than 350 feet from critical habitat which in many cases is well above occupied critical habitat; therefore, no direct effects to Coho Salmon are expected. Due to implementation of project design features and all relevant Best Management Practices, direct effects to other special status aquatic species will be limited to disturbance or displacement at the site during the time work is occurring.

Indirect Effects

All alternatives include watershed project design features that were developed for this project by watershed specialists to minimize impacts to soils and riparian/aquatic resources. Implementation of project design features is critical to ensure that the project meets Forest Plan direction and all other applicable law, regulation, and policy.

Salvage Harvest and Reforestation

These actions are proposed only outside of Riparian Reserves. This analysis concludes that, based on the CWE analysis and post-fire field reviews, proposed salvage and reforestation actions may result in only minor effects to aquatic species and their habitat. Given the substantial landscape-level effects of the 2014 fires, and the slight incremental increase in disturbance that salvage harvest would cause while removing dead trees and allowing for reforestation and quicker restoration of these areas, the negative indirect effects of these actions are expected to be discountable.

Site preparation and planting activities are proposed within salvage units and otherwise mostly within plantations that burned at high or moderate severity. All action alternatives include hand treatments within Riparian Reserves that are within site preparation and planting units unless safety of forest workers prohibits use of these treatments. These treatments target plantations that were heavily burned during recent fires and are within units where ground-disturbing actions are proposed. The hand treatment is designed to provide near-term soil cover in these areas where the natural buffering capacity of the Riparian Reserves has been temporarily lost. The treatment is likely to reduce short term erosion/stream sedimentation at the site level, and help promote and encourage natural regeneration and soil recovery in the Riparian Reserve.

Fuels Reduction

Project design features related to fuels treatments were developed to sufficiently protect Riparian Reserve functions including stream temperature, sediment, and large wood. Therefore, these actions are likely to have discountable short term effects on habitat indicators and minor effects on aquatic species. Additionally, project fuels treatments are designed to reduce the adverse effects of future wildfires and, therefore, would provide some protection for future watershed condition and function, especially if/when the future fire is greater than five years in the future.

Hazard Tree Abatement

The risk of impacts to habitat indicators is associated with removal of groups of hazard trees from within Riparian Reserves that parallel streams or are at road/stream crossings. Project design feature Watershed-14 specifies that all hazard trees greater than 26 inches in diameter at breast height, and within one site-tree distance from a fish bearing stream, will be left onsite. Considering that the probability of wood entering an active stream channel from greater than one tree height is generally low (FEMAT, 1993), this project design feature is likely to ensure that roadside hazard tree removal (the only action that would remove trees from Riparian Reserves) would have discountable effects to large wood recruitment. Based on watershed project design features, and Forest and project-specific Best Management Practices (see appendix D for details) that will be implemented to maintain the function of Riparian Reserves during hazard tree removal (including equipment exclusion and leaving felled trees on site in near-stream zones) and field review of hazard tree removal areas, this analysis concludes that hazard tree abatement along roadsides will have discountable effects to habitat indicators and minor effects to aquatic species.

Roads, Landings and Water Drafting

New temporary roads, particularly temporary road stream crossings, have a high risk for affecting aquatic habitat indicators at the site scale because of their impacts on sediment regimes and drainage networks.

Alternative 2 would have moderate short-term negative effects to habitat indicators (particularly sediment) and aquatic species at the site-scale within these vulnerable drainages, due to construction/reconstruction of temporary roads, installation and removal of stream crossings, and new landings in Riparian Reserves. These temporary road actions include fourteen stream crossings (4 perennial and 10 intermittent streams) that are above the range of fish in the following drainages: Doggett Creek, Buckhorn-Beaver Creek, Grider Creek, O'Neil Creek, Kuntz Creek, China Creek, Caroline Creek-Klamath River , and Whites Gulch. Temporary stream crossings would likely have short duration effects to water quality due to sediment production during in channel actions, and in the first winter after use. Effects for individual crossings would likely be small-scale and limited to the immediate downstream channel reach, depending on flow regime and channel morphology. The intensity of effects would be low for individual crossings. These temporary crossings will be removed before the rainy season (see chapter 2). Therefore the excess material will be removed before debris flow events are likely making the increase in risk small. In some cases, project temporary road actions are proposed on road beds and crossings that were not properly hydrologically stabilized (or decommissioned). Where these sites are actively eroding, or at risk for erosion, they classify as legacy sediment sites and will be treated for hydrologic stabilization after use in this project. Therefore long term beneficial effects in terms of reduced erosion, and/or risk of erosion, are expected at several sites where legacy sediment sources will be addressed (Doggett Creek and Grider Creek, in addition to the legacy site treatment proposed for Elk Creek).

Scale and intensity of temporary road effects could increase to moderate in the case of the long road segment traversing multiple mid- or upper-slope channel crossings in Caroline Creek-Klamath River drainage (46N62). This drainage experienced a debris flow in the 1997 flood event that affected road stream crossings, the largest of which is the Gard Creek crossing which involves a perennial and an intermittent channel. There is also an active landslide below the road, west of Gard Creek, that is narrowing the roadbed. Temporary re-opening of the road will require the reinstallation of stream crossings and widening the road on an active landslide. The effects of this work were incorporated into the geology risk analysis for Caroline Creek-Klamath River drainage. At the site scale the probability of re-activating the landslide by temporarily widening the road is moderate. Where the roadbed is narrowed due to road-fill related landslides, proposed re-construction of this segment could add weight to the head of the landslide which could cause it to re-activate if a landslide producing storm should occur before vegetation is re-established.

Landings located within Riparian Reserves, especially new landings, have a high risk of effects to habitat indicators and aquatic species because landings will disturb soils and vegetation in close proximity to stream channels. Also, landings are locations where equipment/vehicles are used, refueled, and temporarily staged during project activities. Alternative 2 allows for several new landings in Riparian Reserves where they meet specific criteria in a project design feature such as not requiring the removal of any vegetation that provides stream shade, and not involving substantial ground disturbance in areas with direct hydrologic connection to a stream channel (Watershed-5). These effects could be of moderate duration (longer than temporary crossings which are pulled) and low to moderate intensity, depending on the volume of potentially unstable material. Construction and use of these landings in Riparian Reserves still has the potential to cause minor negative effects to habitat indicators and moderate effects to aquatic species at the site-scale, although with implementation of required Best Management Practices and project design features the likelihood of sizeable effects to aquatic resources is relatively low.

Stream reaches that are likely to be negatively affected by temporary road actions and landings include portions of Doggett Creek, Beaver Creek, Grider Creek, O'Neil Creek, Kuntz Creek, Whites Gulch, China Creek, and Klamath River (due to actions in Gard Creek and Caroline Creek drainages).

All action alternatives will require water drafting at the same locations designated by the Forest Service. Vegetation providing stream shade will not be removed, and there will be no modification of drafting sites within Coho Salmon critical habitat. Water drafting can result in short term and localized increases in turbidity, particularly when the water hose is set into and pulled from the water. Watershed project design features (37 and 38) will be implemented to minimize effects of water drafting on sediment and aquatic habitat. A measurable increase in turbidity is not expected beyond the immediate drafting area. Water drafting will result in discountable effects to sediment and minor effects to aquatic species.

Legacy Sites

These activities involve upgrading culverts, including 3 sites that will be upgraded to open bottom arches, and addressing diversion potential and other road-related issues that are a potential threat to water quality (mostly sediment). Project specific design features and BMPs are designed to protect aquatic habitat from impacts associated with these activities. These protective measures are likely to be sufficient so that impacts to aquatic habitat and species are likely to be minor and localized and not result in any significant effect to any special status aquatic species. These actions will also result in meaningful beneficial effects in terms of aquatic organism passage and habitat connectivity at crossings and significant reduction in potential future sediment-related impacts from roads in Doolittle, Cougar, East Fork Elk, and mainstem Elk creeks. Trout would have unimpeded access to a total of about one mile of additional habitat in Malone, Twin, and Upper Elk creeks post-project.

Cumulative Effects

Current and future foreseeable actions considered for analysis within the twenty-nine 6th field watersheds (Table F-1) that intersect the WSFR Project boundary are provided in Appendix F. The activities listed in F-1 were accounted for in the project CWE analysis and interpretation. The KNF uses standardized Cumulative Watershed Effects (CWE) models (Equivalent Roaded Area, Universal Soil Loss Equation, Mass Wasting) to assess effects of past, present, and reasonably foreseeable activities. In addition other current actions, models were updated to incorporate effects of the 2014 fires and road improvements identified in BAER assessments. The modelling provides the fundamental assessment of post-fire existing conditions, as well as an initial assessment of the project *No Action* alternative. Subsequently, effects of project *action alternative*s were modeled based on proposed actions. These model results reflect that there will be minimal cumulative impact from adding the effects of alternative 2 to the past, present and reasonable foreseeable future actions.

The site level analysis found that short term negative effects to aquatic habitat may occur in several stream reaches due to the project. Ongoing and future actions in these drainages where site level effects are expected include grazing, private timber harvest (green and salvage timber harvest plans), and two Forest Service vegetation projects (Thom Seider and Eddy LSR projects). Additive effects related to sediment delivery to streams are likely only as a result of private timber harvest, particularly in Doggett Creek. These effects to habitat are likely restricted to within the first year post project and, although it will contribute to elevated sediment inputs to the Klamath River, it is not expected to appreciably reduce the current quality of fish habitat in Doggett Creek.

- **Management Indicator Species (River/Stream Association)**

Direct Effects

Project actions that occur in streams could directly impact aquatic habitat. These actions are: water drafting; legacy site culvert upgrades, including 3 crossings that will be upgraded to bottomless arch structures to improve aquatic organism passage; and temporary road crossings.

Water drafting will be implemented according to NOAA specifications (when within Coho Salmon critical habitat), Forest Best Management Practices that minimize potential impacts to flows and eliminate the likelihood that sites could be dewatered, and project design features. No more than 10% of streamflow can be taken within NOAA specifications and no more than 50% per Forest Best Management Practices. Also, temporary modification of the streams at drafting sites is prohibited in Coho Salmon critical habitat and restricted in all fish-bearing waters. Therefore, water drafting actions are not likely to meaningfully reduce the quantity or quality of river/stream habitat.

Legacy site culvert upgrades and aquatic organism passage improvement projects include protective measures to eliminate, or minimize to discountable levels, the potential short-term negative effects to aquatic habitat which may only occur during and immediately after construction. The amount of habitat affected is limited to the immediate area of stream channel where work is occurring. These actions are directed to occur during the driest part of the season. If there is any flow present, the work site is dewatered then re-watered at the completion of work, according to Best Management Practices and protection measures agreed upon during interagency ESA consultation to sufficiently minimize negative effects to salmonids (Facilities Maintenance and Watershed Restoration programmatic Biological Assessment 2004).

Temporary roads used by the project include stream crossings. Direct effects to aquatic habitat may occur while crossings on temporary roads are being constructed, or reconstructed, used, and hydrologically restored after use. Due to these actions river/stream habitat for management indicator species may be affected at 14 sites; four perennial stream crossings and ten intermittent stream crossings, none of which are fish-bearing. Reaches of Doggett Creek, Beaver Creek, Grider Creek, O’Neil Creek, Kuntz Creek, Whites Gulch, China Creek, Gard Creek, and Caroline Creek would be affected.

Indirect Effects

Vegetation treatments proposed only include Riparian Reserve treatment within site preparation and planting units and within fuels treatment units. These treatments will provide ground cover, reduce fuel accumulations, and encourage natural regeneration in Riparian Reserves. Equipment and activities such as handline construction are restricted within Riparan Reserves so that additional ground disturbance from these activities is not likely to result in any effect to aquatic habitat. These treatments are designed to provide benefits to aquatic habitat by providing near-term ground cover to help slow overland flow and filter sediment before it reaches stream channels; these actions are likely to provide short term protection of aquatic habitat and encourage natural revegetation in Riparian Reserves.

Salvage is not proposed within Riparian Reserves so there would be no effects of this treatment on Riparian Reserves.

There will be beneficial effects to aquatic species, and to the connectivity of aquatic habitat, at the three sites that will have crossings upgraded with bottomless arches. These sites are in the lowest reaches of Twin Creeks and Malone Creek, just upstream of their confluence with Elk Creek (just upstream of confluence of Elk and East Fork Elk Creeks), and in upper East Fork Elk Creek (see project maps). These structures will allow for free movement of special status fish and amphibian species under these road crossings where passage has been blocked for many years during most or all flows. Trout are likely to have unimpeded access to at total of about one mile of additional habitat in Malone, Twin, and Upper Elk creeks post-project. The culvert upgrades, to occur on 45 sites, will also have beneficial effects to the passage of watershed products like coarse sediment and large wood down through the Elk Creek watershed. All action alternatives also include stormproofing 33 miles of road in the Elk Creek watershed. These actions will provide additional benefit to aquatic habitat in Doolittle, Cougar, East Fork Elk, and mainstem Elk creeks by reducing diversion potential and chronic sediment inputs from roads.

Cumulative Effects

Project effects to river/stream MIS habitat will not reduce the quantity of habitat available. The quality of MIS habitat is expected to be temporarily reduced along stream reaches associated with the 14 sites where temporary road crossings and landings are constructed. Due to the legacy sediment site treatments included in the project, the quality of MIS habitat will be improved long-term in reaches of Elk Creek, Doggett Creek, and Grider Creek because sites with active erosion, or at risk for erosion, will be hydrologically stabilized. River/stream habitat for resident trout, tailed frog and Cascade frog will benefit from meaningful improvement in habitat connectivity along a total of about one mile in Twin, and Upper Elk creeks post-project as a result of three aquatic organism passage upgrades.

Alternative 3

Threatened/Endangered and Forest Service Sensitive Species

Direct Effects

The direct effects of alternative 3 are the roughly the same as for alternative 2.

Indirect Effects

Salvage Harvest and Reforestation

Reforestation actions, and potential effects, are the same as for alternative 2. Alternative 3 eliminates salvage harvest in the Beaver Fire area, and reduces salvage acreage in Happy Camp Fire area substantially (in Walker Creek and Caroline Creek-Klamath River drainages). Therefore, any impacts to Beaver Creek associated with salvage harvest are eliminated under this alternative and there would be a slight reduction in harvest-related impacts in Walker Creek and the mid-Klamath River.

Fuels Reduction

Fuels reduction actions, and potential effects, are the same as for alternative 2.

- ***Hazard Tree Abatement***.

Hazard tree actions, and potential effects, are the same as for alternative 2.

Roads, Landings and Water Drafting

All sites where negative short term effects to aquatic habitat are expected with alternative 2 remain in alternative 3. Therefore, roads, landings, and water drafting actions, and potential effects, are roughly the same as for alternative 2.

Legacy Sites

Legacy sediment site treatments, and potential effects, are the same as for alternative 2.

Cumulative Effects

Cumulative effects will be slightly less where salvage and associated roads/landings are dropped (Walker and Beaver Creeks).

Management Indicator Species

Direct Effects

Direct effects of alternative 3 on aquatic habitat are the same as for alternative 2.

Indirect Effects

Indirect effects would be roughly the same as for alternative 2.

Cumulative Effects

Cumulative effects would be roughly the same as for alternative 2.

Alternative 4

Threatened/Endangered and Forest Service Sensitive Species

Direct Effects

The direct effects of alternative 4 are roughly the same as for alternative 2.

Indirect Effects

Alternative 4 includes a limitation on use and construction of temporary roads in sensitive watersheds (which reduces several harvest units and landings). Therefore, site level negative effects that may occur with alternative 2 will not occur with alternative 4.

Alternative 4 also includes a lop-and-scatter hand treatment (trees less than 16 inches in diameter at breast height) within Riparian Reserves within salvage units unless safety of forest workers prohibits it. These actions are designed to increase near-term soil cover in fire-affected Riparian Reserves to help slow overland flow and trap/filter sediment before it enters stream channels. Planting is not included in Riparian Reserves, but the hand cut lop/scatter treatments would help to promote natural revegetation and recovery of soils in these Riparian Reserves.

Salvage Harvest and Reforestation

Reforestation actions, and potential effects, are the same as for alternative 2. Alternative 4 reduces salvage harvest acreage by approximately 900 acres across the project area so there will be a slight reduction in the discountable effects described for alternative 2.

Fuels Reduction

Fuels reduction actions, and potential effects, are the same as for alternative 2.

Hazard Tree Abatement

Alternative 4 reduces the extent of hazard tree removal by not including this treatment on Maintenance Level 1 roads that will not be used by the project. This reduces the total acreage potentially affected by hazard tree removal by about 1,000 acres. Therefore, the discountable effects described for alternative 2 are slightly reduced in this alternative in the following drainages: Lower West Fork Beaver, Dutch Creek, Middle Creek, Deep Creek, and Horse Creek.

Roads, Landings and Water Drafting

Water drafting actions, and potential effects, are the same as with alternative 2. Alternative 4 is notably different than the other action alternatives with respect to construction and use of temporary roads as it limits these actions in sensitive watersheds to only include ridgetop sections of temporary road no longer than 250 feet and precludes stream-crossing construction. New landing construction in Riparian Reserves is also eliminated under this alternative, so exceptions granted under alternative 2 do not apply with alternative 4 and potential negative effects from new landings in Riparian Reserves are eliminated. Because this alternative eliminates these activities in these areas, the effects will be discountable and may result in only minor effects to aquatic species at both the watershed and the site scale. With alternative 4 there will be no short term negative impacts to reaches within the following streams: Doggett Creek, Beaver Creek, Grider Creek, O'Neil Creek, Kuntz Creek, Whites Gulch, China Creek, Gard Creek, and Caroline Creek.

With alternatives 2, 3, and 5 there are several sites (along tributaries of Doggett and Grider) where project temporary road actions involve using roads that currently have legacy sediment sites, or areas that are at risk of erosion (and therefore a threat to water quality) due to past land use. When/if the project uses these roads they will be hydrologically stabilized and any active erosion, or risk of erosion will be addressed. For the drainages where this would occur with the action alternatives, the opportunity to improve/protect water quality in these areas would be foregone with alternative 4.

Legacy Sites

Legacy sediment site treatments, and potential effects, are the same as for alternative 2.

Cumulative Effects

Cumulative effects will be less with alternative 4 because actions that are likely to result in negative short term effects at the site scale (temporary road crossings and new landings in RR) are eliminated. With alternative 4, the project is not likely to add to the elevated sediment conditions in Doggett Creek which largely result from fire effects along with substantial private timber harvest.

Management Indicator Species

Direct Effects

Direct effects due to water drafting and legacy sediment site treatment are the same as alternative 2. Site level direct effects due to temporary road crossings are eliminated with this alternative.

Indirect Effects

Indirect effects of alternative 4 are roughly the same as with alternative 2.

Cumulative Effects

Cumulative effects of alternative 4 would be less than alternative 2 because river/stream habitat at the 14 temporary road crossing locations would not be affected with alternative 4.

Alternative 5

Threatened/Endangered and Forest Service Sensitive Species

Direct Effects

The direct effects of alternative 5 are the same as for alternative 2.

Indirect Effects

Salvage Harvest and Reforestation

Alternative 5 eliminates salvage harvest in areas designated as late successional reserve in the Forest Plan, and eliminates site preparation and planting in these areas plus in riparian reserves and inventoried roadless areas. Compared to alternative 2, many fewer acres in the Happy Camp and Whites fire areas will have salvage and reforestation treatments. The potential discountable effects resulting from these treatments (described for alternative 2) will be moderately reduced with this alternative. This alternative removes site preparation and planting on about 3,300 acres in the Happy Camp Fire area, and 650 acres in Whites Fire, compared to alternative 2. The beneficial effect of site preparation and planting on reforesting parts of the burned landscape will be foregone on these acres.

Fuels Reduction

Alternative 5 includes about 1,000 more acres of fuels treatment in the Beaver Fire area than are in other action alternatives. As described for alternative 2, fuel reduction actions are likely to have only discountable negative short-term effects on habitat indicators and minor effects on aquatic species. Additionally, project fuels treatments are designed to reduce the adverse effects of future wildfires and, therefore, will provide some protection for future watershed condition and function, especially if/when the future fire is greater than five years in the future.

Hazard Tree Abatement

Hazard tree actions, and potential effects, are the same as for alternatives 2.

Roads, Landings and Water Drafting

Because this alternative involves substantially less salvage, and site preparation and planting acreage, landings and road actions are also reduced, potentially sizeable site-level effects of temporary road crossings and landings are reduced with this alternative, but not eliminated. Site level negative short term effects to aquatic habitat are expected in the following streams: Doggett Creek, Beaver Creek, Kuntz Creek, Whites Gulch, Gard Creek, and Caroline Creek; negative effects described for alternative 2 are avoided in Grider Creek, O’Neil Creek, and China Creek. The extent of water drafting needed to support implementation of this alternative will also be reduced.

Legacy Sites

Legacy sediment site treatments, and potential effects, are the same as for alternative 2.

Cumulative Effects

Cumulative effects will be the same as for alternative 2.

Management Indicator Species

Direct Effects

Direct effects of alternative 5 on aquatic habitat are slightly less than with alternative 2. Temporary road crossings do not include reaches of Grider Creek, O’Neil Creek, or China Creek; therefore, site level negative effects to aquatic habitat at these locations are avoided.

Indirect Effects

Indirect effects of alternative 5 are roughly the same as for alternative 2.

Cumulative Effects

Cumulative effects would be roughly the same as for alternative 2.

Comparison of Effects

Table 3-23 displays miles of temporary road and number of stream crossings under each alternative. Although some of this information is available in chapter 2 of this draft EIS, more specific information on stream crossings is displayed in table 3-23.

Table 3-23: Miles of temporary roads needed for the action alternatives and number of stream crossings

Road type or Stream Crossings Needed	Alternatives 2 and 3	Alternative 4	Alternative 5
Miles New Temporary Road	3.6	1.2	0.8
Miles Temporary Roads on Existing Alignment (Roadbed)	9.9	2.7	4.0
*Miles of Reopening of Decommissioned Roads	9.0	0.4	3.4
Total Miles of Temporary Roads	**22.6**	**4.4**	**8.1**
Number of Temporary Road Stream Crossings	14	0	8
Number of Temporary Road Stream Crossings in fish habitat	0	0	0

Potential direct effects to aquatic species from all of the action alternatives are associated with water drafting and legacy sediment site repair. Indirect effects to aquatic habitat are primarily associated with temporary road and stream-crossing construction within sensitive drainages, and locating landings within Riparian Reserves. These higher risk actions are proposed under all action alternatives, with the exception of Alternative 4 which limits temporary road building and eliminates stream crossings. Alternative 4 addresses watershed concerns by limiting temporary road construction in sensitive watersheds to short segments on ridgetops that are not hydrologically connected to the drainage network, precludes stream crossing installations within sensitive watersheds, and prohibits new landings within Riparian Reserves.

The implementation of project design features, and in particular those developed to reduce negative impacts to watershed values, minimizes negative direct and indirect effects to habitat indicators (sediment, water temperature and large wood) under all action alternatives. All action alternatives include hand lop-and-scatter treatments in Riparian Reserves of heavily fire-affected site prep and plant (plantation) units, where safety allows, which will provide near term ground cover and promote soil recovery and regeneration in riparian areas. Alternative 4 includes additional protections for aquatic resources in sensitive watersheds. In addition to the limitations on roads, stream crossings and landings as described above, Alternative 4 reduces site-scale sedimentation concerns by also requiring lop-and-scatter hand treatments in Riparian Reserves within salvage harvest units, where safety allows, to improve ground cover. These measures are important, and may provide meaningful benefit to downstream aquatic habitat, given the degraded conditions on the landscape as a result of the 2014 wildfires.

The CWE models indicate the severity of effects to watershed disturbance that was associated with the 2014 wildfires. The action alternatives add only a slight incremental increase to this disturbance, an increase that is determined to be minor at the watershed scale. Roads and landings within Riparian Reserves represent the highest risk of negative effects to habitat indicators at the site-scale in sensitive watersheds. Implementation of the action alternatives will allow for a faster recovery of conifer stands in these burned watersheds than will alternative 1. Alternative 4 allows for this recovery and addresses impacts to habitat indicators and aquatic species in sensitive watersheds.

Relative to aquatic species, alternatives 2, 3, and 5 involve short term negative effects to habitat at the site scale (due to temporary road actions and landings) for the following special status aquatic species: resident trout and tailed frog (MIS); foothill yellow-legged frog, Cascade frog, and western pond turtle (Forest Service Sensitive). Habitat for Coho Salmon (Threatened), Chinook salmon, steelhead, Pacific lamprey, and Klamath River lamprey (Forest Service Sensitive) may also be negatively affected with alternatives 2, 3, and 5. These impacts are expected in large part due to the vulnerable post fire condition of project area watersheds and streams where project disturbance would occur. With alternative 4 these site level impacts to aquatic habitat are avoided, and also site level benefits are lost for a few sites where project hydrologic stabilization of existing road beds and crossings (after use in the project) would benefit/protect water quality long term. All action alternatives include hand lop-and-scatter treatments in heavily burned plantation Riparian Reserves, where safe, which will provide benefits; only alternative 4 adds this beneficial treatment to Riparian Reserves in salvage units which may provide meaningful benefit to downstream habitat in the drainages it occurs. All alternatives include legacy sediment site treatment, including aquatic organism passage improvement, in Elk Creek watershed.

Table 3-24: Summary of comparison of effects of alternatives for aquatic resource analysis indicators

Indicator	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Temperature	Discountable	Discountable	Discountable	Discountable
Sediment				
Site-Scale	Potentially Sizeable	Potentially Sizeable	Discountable	Minor Negative
Watershed Scale	Discountable	Discountable	Discountable	Discountable
Large Wood	Discountable	Discountable	Discountable	Discountable

Compliance with law, regulation, policy, and the Forest Plan

The Forest Plan consistency checklist reflects how the project meets specific standards and guidelines from the Forest Plan. Interagency consultation under Endangered Species Act section 7 is currently in progress with National Marine Fisheries Service; this will also include consultation under the Magnuson-Stevens Fishery Conservation and Management Act.

Soil

This section describes the current situation and effects of the project on soil resources.

Methodology and Analysis Indicators

Analysis of the effects of individual management activities on the soil resource (soil productivity and soil ecosystem functionality) is guided by the Forest Plan Standards and Guidelines and FSM 2500, Chapter 2550, Supplement 2500-2012-1. Four indicators were chosen that address relevant issues in the Westside Fire Recovery project (project) and measure compliance with Forest Plan Standard and Guidelines. The indicators include: soil stability, surface organic matter, soil organic matter, and soil structure.

The unit measures for each indicator is acres not meeting desired conditions. Soil stability desired conditions are not met when Erosion Hazard Ratios (EHRs) are high or when soil cover is less than 30 percent.

For this project, surface organic matter is coarse wood greater than 12 inches in diameter which is either down, or standing and dead. The surface organic matter indicator is not met when this material averages less than 200 cubic feet per acre, and partially meets when it averages less than 500 cubic feet per acre.

Soil organic matter desired conditions are not met when major portions of the area have had the upper soil layer displaced or removed to a depth of 8 inches and an area large enough to affect productivity for the desired plant species (100 square feet).

Soil structure desired conditions are not met when major portions of the area have reduced infiltration and permeability capacity indicated by soil structure and macro-porosity changes. Infiltration is the process by which water on the ground surface enters the soil. Soil macro-porosity is the amount of the soil that is composed of larger pores which are important for soil water movement and gas exchange.

The projected acres not meeting desired conditions for each indicator and activity type were determined from monitoring data collected from previous salvage projects, and based on scientific research.

Spatial and Temporal Context

For all four soil indicators, the analysis area is bounded by the project activity units because this is where impacts to soil could occur. The analysis is further bounded in time by the foreseeable future period during which effects of this project can persist as detectable, significant effects. Soil cover, as it affects soil stability, can recover quickly if needle-cast is available, and grasses, forbs, and shrubs re-sprout. The temporal boundary for soil stability is five years. Soil organic matter can take a long time to rebuild after it is lost through displacement or erosion. Once compacted, soil structure can remain affected for decades. The temporal boundary for soil organic matter, surface organic matter, and soil structure is 30 years.

Affected Environment

Soils within the project area are mainly derived from metamorphic rock, granitic rock, glacial till, or ultramafic rock. A soil map can be found in appendix A of the Soil resource report and table 4 of that report displays the proportion of general soil groups and the corresponding soil properties used in the analysis of this report.

The dominant soils within the analysis area are mostly sandy loams or loams with gravelly to extremely gravelly texture modifiers, indicating high natural infiltration rates, and high rock content in many areas. These soils range from shallow to deep, reflecting a wide range of soil productivity and soil hydrologic groups. Specific dominant soils include the Clallam, Holland, Gilligan, Deadwood, and Jayar. Compaction ratings are moderate for these soils.

The affected environment includes past actions within the project area. The 2014 wildfires have impacted soil organic matter and soil cover. The greatest impacts to soil structure have occurred on approximately 1,500 acres that have been impacted by vegetation management using heavy equipment within the last 30 years. Field monitoring results indicate that the extent of detrimentally compacted soil is minimal, yet soil cover and soil organic matter have been impacted. This indicates past forest management has had a minimal impact on detrimental soil porosity and the 2014 fires have likely overshadowed past management effects to soil cover and organic matter. The existing soil condition is most dominated by the Whites, Beaver, and Happy Camp fires that burned through the project area between July and September 2014.

Currently, approximately 500 acres of the project area are not meeting desired conditions for soil stability (see table 5 of the Soil resource report). The areas that are not meeting the desired condition have high EHRs due to recent wildfires which combusted organic matter on top of the soil surface. Soil disturbance resulting in bare soil (less than 30 percent cover) generally results in high EHRs if slopes are greater than 20 percent.

The current condition is that approximately 660 acres of the project area are not meeting desired conditions for soil organic matter because they have high Soil Burn Severities (SBS). Major impacts to soil productivity have occurred in areas with moderate to high SBS. Negative impacts include destruction of the protective vegetation canopy and forest floor, a significant loss of soil carbon and nitrogen, and reduced infiltration capacity, which can lead to landslides, dry ravel (downslope movement of loose, dry particles), and erosion by wind and water causing increased runoff and sediment input into streams (Erickson 2008).

All of the project area is meeting the desired condition for surface organic matter. Although many areas of the project have less than 200 cubic feet per acre of large woody debris in contact with the soil, there is a high volume of standing dead trees, greater than 12 inch diameter. These would contribute organic material to the soil surface within the next several years and would eventually be cycled into the soil to provide for plant growth.

It is estimated less than 20 acres of the project area are not meeting desired conditions for soil structure because severe soil compaction was measured on 2 percent of the soil plots monitored and approximately 1,500 acres have been impacted by harvest equipment during the last 30 years. Within the project area, soil textures of sandy loam and loam produce moderate compaction ratings (table 2 of the Soil resource report).

Environmental Consequences

Alternative 1

Direct Effects and Indirect Effects

Immediately following the 2014 fires, EHRs were high on approximately 57 percent of the project area. Within one year following the fire, soil cover would increase on areas with low to moderate soil burn severities. Soil cover is less likely to increase on areas with high SBS because tree canopy has been consumed. Therefore, areas with high EHRs would decrease to moderate, except where there is high SBS on approximately 490 acres. These areas would not meet the desired condition for soil stability. Based on field data collected, it is estimated that soil cover is less than 30 percent on this same area. Effective soil cover will only be fully reestablished after surface vegetation recovers. This will expose the soil to higher erosion potential over the next 3 to 6 years (Berg and Azuma 2010).

Under alternative 1, large surface organic matter could reach sufficient levels within approximately five years and contribute to the recovery of soil productivity. It is possible that the surface organic matter indicator would not be met if material greater than 12 inch diameter exceeds 800 cubic feet. If a wildfire occurs during the next 10 to 15 years, soils would burn with a high SBS directly beneath this large woody debris. This could occur on approximately 2,500 acres of the project area and it's estimated large wood could cover 5 to 10 percent of this area.

Soil organic matter will remain intact unless severe storm events result in the loss of large amounts of topsoil. Soil structure conditions will remain the same in the short term, with very slow long-term natural recovery of old skid trails and landings.

Cumulative Effects

Grazing is the only reasonably foreseeable future action that would occur within the same area as this project. Although minimal amounts of grazing activities are ongoing within allotments found within the project area, most of the project activities are proposed on steeper slopes which cattle use rarely, if ever, or are largely transitory in nature. Further, annual operating instructions provided to permittees will limit permitted grazing activities as needed to minimize impacts, not only to rangeland health but also to soil conditions (see range section of this chapter and the Rangeland resource report). For these reasons, no measurable cumulative impacts to soil indicators are anticipated as a result of ongoing grazing activities when added to the activities proposed with this project.

Wildfire and forest management are an ongoing impact to soil stability, surface organic matter, soil organic matter and soil structure. The effects from the 2014 wildfires overwhelm effects from past management practices. The cumulative effects for alternative 1 would be a continued increase in soil stability due to falling needles, branches, and eventually tree boles. This would result in decreased EHRs and a gradual increase in soil organic matter as material decomposes. These processes would encourage the return of vegetation which would further increase soil cover and eventually soil organic matter. Soil organic matter would reach desired conditions more slowly in areas with high SBS, and recovery could take several decades to a century. Surface organic matter would be expected to reach desired conditions within approximately 10 years.

Damage to soil structure would continue to ameliorate, yet this process occurs slowly. The most compacted areas could take approximately 30 years to reach desired condition.

The natural falling of dead needles, branches, and eventually tree boles would continue to assist in the recovery of soil stability. Larger surface organic matter would be added from the falling of tree boles over the next 5 to 10 years to meet the surface organic matter indicator. The surface organic matter indicator may not be met if a wildfire occurs during the next 10 to 15 years, resulting in high SBS directly beneath large woody material in contact with the soil. Soil organic matter will remain intact unless severe storm events result in the loss of large amounts of topsoil. Soil structure conditions will remain the same in the short term, with very slow long-term natural recovery of old skid trails and landings.

Soil indicators would not be met on approximately 660 acres for alternative 1. This occurs mainly where soils burned with high SBS and soil stability and soil organic material (SOM) have been impacted.

Alternative 2

Direct Effects and Indirect Effects

On approximately 2,000 acres, soil stability and SOM would be impacted with most disturbances on temporary roads, landings, and skid trails. Construction of new temporary roads, associated with ground based harvest, would have the highest impact to soil stability and sedimentation (Rice et al. 1972). Newly constructed roads are the largest source of erosion and this is exacerbated in a burned environment because the capacity of the landscape to moderate flow and trap sediment is greatly reduced (Peterson et al. 2009). Project design features would require subsoiling 60 percent of new temporary roads and landings, and would require maintaining at least 50 percent effective soil cover. If soil cover is not available, soil stability and SOM could be impacted over the long term. Subsoiling would promote the recovery of soil stability, SOM, and soil structure yet soil productivity would remain impacted over the long term on compacted surfaces that are not subsoiled. This includes skid trails, existing or previously decommissioned temporary roads, and existing landings. Soil structure would be impacted on approximately 15 percent of ground-based harvest and less than 1 percent of helicopter and skyline.

During harvest, felling of dead trees would increase soil cover approximately 10 to 20 percent. Ground based skidding would remove soil cover and impact SOM on approximately 30 percent, 10 percent of skyline, and less than 1 percent of helicopter. Post fire accelerated erosion due to ground based salvage logging could result in a 6 to 1,000 fold increase in sediment production (Wagenbrenner 2015). This would mainly occur due to reduced infiltration on skid trails and other areas disturbed by ground based equipment, which would concentrate runoff as rill erosion. Where skidding occurs through areas with less than 50 percent soil cover, a project design feature would require applying at least 50 percent soil cover on skid trails greater than 15 percent slope. This could limit accelerated erosion on areas with higher EHRs.

Reductions in large woody material could lessen impacts to SOM if a wildfire occurs 10 to 15 years from now. Fuels specialist collected plot data which indicates reductions of large woody material could lessen impacts on approximately one third of the harvested area.

Vegetation recovery and subsequent ground cover could lag behind undisturbed areas by three years or more (Robichaud 2011). Seedlings that germinate following a wildfire may be damaged or killed by mechanical disturbance associate with subsequent salvage logging (Van Nieuwstadt 2001). Areas most heavily impacted such as landings and main skid trails would be the slowest to recover. Ground-based harvest would be expected to delay vegetation recovery on up to 30 percent of a units area, and ground based harvest of roadside hazard could impact 30 to 60 percent. Vegetation began to recover almost immediately following the fires and will continue to add soil cover and increase soil stability where undisturbed.

Site preparation or fuels management zones could result in impacts to soil cover, soil organic matter and soil structure, especially if mechanical equipment is used. A project design feature would require site preparation treatments to be designed to meet the Forest Plan soil management direction. Site preparation and tree planting could benefit soil stability and SOM if brush fields, which are less effective soil cover, would otherwise dominate the site over the long term.

Proposed underburning would have minimal impacts to soil stability. The greatest impacts would occur due to line construction activities where dozers are used to re-scrape control lines to mineral soil.

Proposed legacy site treatments would be designed to improve soil stability over the long term. Minor, localized impacts to soil stability and SOM could occur due to culvert replacements and road maintenance, yet implementation of best management practices would maintain soil cover on disturbed areas. Road maintenance would have a beneficial impact to soil stability by improving drainage and decreasing the potential for rill and gully erosion. Likewise, culvert upgrades would decrease the diversion potential of drainages and resulting accelerated erosion.

For alternative 2, 2,800 acres would not meet desired conditions for soil stability, 825 would not meet surface organic matter, 2,214 acres for SOM, and 1,255 for soil structure.

Cumulative Effects

Adding the effects of alterative 2 to the effects of past, present, and reasonably foreseeable future actions could have substantial negative effects on soil desired conditions. Past effects due to forest management and the 2014 fires have been considered and discussed in the affected environment and the effects to soil stability, surface organic matter, soil organic matter and soil structure addressed there. Impacts to soil structure would occur on 70 acres proposed for ground-based harvest where harvest has occurred in the past 10 years.

Effects from grazing are as discussed under alternative 1. Adding these effects to the effects of alternative 2 will not result in measurable cumulative effects. On approximately 2,800 acres, soil indicators would not be met. This is an increase of approximately 2,300 acres compared to alternative 1. The number of acres that do not meet desired conditions for soil structure, soil organic matter, and soil structure is reduced to the extent possible with project design features.

Soil stability and SOM would be impacted most due to disturbance on temporary roads and landings. During harvest, felling of dead trees would increase soil cover approximately 10 to 20 percent. Ground based skidding would then remove soil cover and impact SOM on approximately 30 percent, 10 percent of skyline, and less than 1 percent of helicopter. Soil structure would not meet desired conditions on approximately 1,255 acres, mainly on new temporary roads, landings, and skid trails. Site preparation or fuels management zones could result in impacts to soil indicators, especially if mechanical equipment is used. Site preparation and tree planting could benefit soil stability and SOM if brush fields, which are less effective as soil cover, would otherwise dominate the site over the long term.

Alternative 3

Direct Effects and Indirect Effects

Alternative 3 would propose approximately 480 fewer acres of ground-based harvest, 250 fewer acres of helicopter and 310 fewer acres of skyline harvest than alternative 2therefore, fewer acres would be impacted by ground-based mechanical equipment.

Alternative 3 proposes 1,215 fewer acres of fuel management zone treatments. This would decrease the area that would not meet desired soil conditions by approximately 100 acres because less soil cover would be removed due to use of mechanical equipment and removal of vegetation providing soil cover.

Under alternative 3, mechanical equipment would remove soil cover on approximately 940 acres in addition to 495 acres that would have high EHRs in alternative 1; a total of approximately 1,435 acres of the project area would not meet desired conditions for soil stability (see table 5 in the Soil resource report).

Reductions in large woody material could lessen impacts to SOM if a wildfire occurs 10 to 15 years from now. Fuels specialist collected plot data which indicates reductions of large woody material could lessen impacts on approximately one third of the harvested area.

For alternative 3, 2,380 acres would not meet desired conditions for soil stability, 560 would not meet surface organic matter, 1,980 acres for SOM, and 1,085 for soil structure.

Cumulative Effects

The cumulative effects of alternative 3 would be very similar to alternative 2. Adding the effects of alterative 3 to the effects of past, present, and reasonably foreseeable future actions could have measurable negative effects on soil desired conditions. The highest cumulative impacts to soil stability and surface organic matter would occur when mechanical equipment is used on soil that burned with a high SBS. Project design features have been developed to maintain soil cover and restrict additional use of mechanical equipment when desired conditions are most likely not met.

On approximately 2,400 acres, soil indicators would not be met. This is an increase of approximately 1,900 acres compared to alternative 1. The number of acres that do not meet desired conditions for soil structure, soil organic matter, and soil structure is reduced to the extent possible with project design features.

Alternative 4

Direct Effects and Indirect Effects

Alternative 4 would propose approximately 70 fewer acres of ground-based harvest, 560 fewer acres of skyline and 290 fewer acres of helicopter than in alternative 2; therefore, fewer acres would be affected by mechanical equipment. In addition, 2.4 miles less temporary roads would be constructed, 15.8 miles less existing and previously decommissioned roads would be used, 10 fewer existing landings would be used, and 40 fewer new landings would be constructed.

The decreased use of landings would result in the greatest decrease, approximately 50 acres, of area not meeting the soil stability indicator. Less ground-based harvest would result in approximately 30 fewer acres where soil stability is not met, and 16 fewer acres because less temporary roads would be used or constructed.

Under alternative 4, mechanical equipment would remove soil cover on approximately 1,450 acres and, in addition to 495 acres which would have high EHRs under alternative 1, a total of approximately 1,945 acres of the project area would not meet desired conditions for soil stability (see table 5 of the Soil resource report). This is 360 fewer acres compared to alternative 2.

Alternative 4 proposes to harvest fewer ground-based and skyline units. Therefore, approximately 440 acres would not meet the surface organic matter indicator which is 390 fewer acres compared to alternative 2.

Fewer acres proposed for ground based harvest, and fuel management zone treatments would result in less impact to SOM because less area would be impacted by mechanical equipment. It’s estimated approximately 1,450 acres would not meet desired conditions for SOM under alternative 3. This is a decrease of 530 acres compared to alternative 2. Fewer acres of proposed ground based harvest and fuel management zone treatment would decrease impacts to soil stability and SOM. Fewer temporary roads and landings would reduce impacts to soil stability, SOM, and soil structure. Site preparation and tree planting could benefit soil stability and SOM if brush fields, which are less effective as soil cover, would otherwise dominate the site over the long term.

Reductions in large woody material could lessen impacts to SOM if a wildfire occurs 10 to 15 years from now. Fuels specialist collected plot data which indicates reductions of large woody material could lessen impacts on approximately one third of the harvested area.

For Alternative 4, 2,415 acres would not meet desired conditions for soil stability, 440 would not meet surface organic matter, 1,690 acres for SOM, and 1,090 for soil structure.

Cumulative Effects

The cumulative effects of alternative 4 would be very similar to alternative 2. Adding the effects of alterative 4 to the effects of past, present, and reasonably foreseeable future actions could have measurable negative effects on soil desired conditions.

On approximately 2,400 acres, soil indicators would not be met. This is an increase of approximately 1,900 acres compared to alternative 1. The number of acres that do not meet desired conditions for soil structure, soil organic matter, and soil structure is reduced to the extent possible with project design features.

Alternative 5

Direct Effects and Indirect Effects

Alternative 5 would propose approximately 290 fewer acres of ground-based harvest, 2,780 fewer acres of skyline and 1,840 fewer acres of helicopter compared to alternative 2; therefore, fewer impacts would occur due to mechanical equipment. In addition, 29 fewer existing landings would be used, and 18 fewer new landings would be constructed.

Reductions in large woody material could lessen impacts to SOM if a wildfire occurs 10 to 15 years from now. Fuels specialist collected plot data which indicates reductions of large woody material could lessen impacts on approximately one third of the harvested area.

Less ground-based harvest would result in the greatest decrease, approximately 125 acres, of area not meeting the soil stability, SOM, and soil structure indicator. Fewer landings used would result in approximately 115 fewer acres where these indicators would not be met. Site preparation and tree planting could benefit soil stability and SOM if brush fields, which are less effective as soil cover, would otherwise dominate the site over the long term.

Fewer acres proposed for ground-based harvest would result in less compaction. It’s estimated alternative 5 would result in approximately 370 acres with reduced infiltration which is 650 acres less than alternative 2.

Cumulative Effects

The cumulative effects of alternative 5 would be very similar to alternative 2. Adding the effects of alterative 5 to the effects of past, present, and reasonably foreseeable future actions could have measurable negative effects on soil desired conditions.

On approximately 1,600 acres, soil indicators would not be met. This is an increase of approximately 1,100 acres compared to alternative 1. The number of acres that do not meet desired conditions for soil structure, soil organic matter, and soil structure is reduced to the extent possible with project design features.

Compliance with law, regulation, policy, and the Forest Plan

Although soil indicators would not be met on about 4,000 acres, this is less than 10 percent of the project area. Therefore, Forest Plan Standard and Guidelines 3-1 and 3-2 would be met at the project scale. A forest consistency checklist has been completed that reviews the soil standards and guidelines. Forest Plan Standard and Guidelines 3-3 through 3-6 would be met because project activities are not expected to result in major decreases to surface organic matter and soil organic matter. Forest Plan Standard and Guideline 3-7 has been met by the selection of soil plots where soils were field verified.

Geology

Methodology

Three days of field review were completed to validate geologic and geomorphic mapping. Unstable lands are designated as Riparian Reserves in the Forest Plan (Standard and Guideline MA 10-2, pg. 4-108). The unstable lands component of Riparian Reserves includes active landslides, inner gorges, toe zones of dormant landslides and severely weathered and dissected granitic lands. See map in appendix C for location of unstable lands in the project area. This analysis assumes that if less than 1 percent of the 7th field watershed is in the project boundary there will be no effect to landslide risk. So only the sixty-seven watersheds with greater than 1 percent of their area in the project boundary are analyzed (see appendix B of the Geology resource report for list of watersheds analyzed).

The Cumulative Watershed Effects GEO model is used to estimate the landslide potential. The model uses mapping of the geomorphology, past and present disturbances, and coefficients developed using research on the effects of the 1964 flood event on landslide rates. The output from the model is volume of sediment delivered to the mouth of the 7th field watershed during a 10-year storm event (cubic yards per decade). The volumes are converted into a risk ratio to estimate landslide potential across the Forest and among project alternatives. A threshold of concern for the risk ratio is 1.0. This is not the point at which significant effects occur but a yellow flag indicating that additional impacts need to be considered closely for resource degradation and impacts to beneficial uses of water. Mitigations to prevent unacceptable negative impacts will be considered for watersheds with proposed activities that are over the threshold of concern. A more detailed description of the cumulative watershed effects modeling process is available in a Forest-wide document (Bell, 2012).

The indicator used in this analysis for effects on unstable lands is landslide risk. Risk is the intersection between the potential of landsliding and the consequence of landsliding. Landslide potential is estimated from the GEO model risk ratio. Consequences analyzed include: 1) impacts to human health and safety; 2) impacts to infrastructure; and 3) impacts to natural resources. Landslide risk ranges from very high, which indicates an immediate need for mitigation of the risk, to very low, which indicates a nuisance disruption. See appendix A of the Geology resource report for details.

The long-term elevated risk of landslide in a 7th field watershed is related to tree root support. Areas with compromised root support (due to fire or forest management) have about 6.5 times higher landslide rate than areas with intact roots (Amarathus et al. 1985). After trees die the root support begins to decline immediately and provide almost no support after about a decade. Duration of elevated risk is analyzed using the state of vegetation in a 7th field watershed. The measure of duration of elevated risk will be the percent of the watershed with moderate or high severity wildfire left to naturally regenerate (or left unplanted). So, if more than 75 percent of the high and moderate vegetation burn severity is left to naturally regenerate the duration of elevated risk in the watershed is assumed to be greater than 80 years. If the percent left unplanted in a watershed is less than 75 percent, it will be assumed that the duration of elevated risk is about 30 years. If less than 10 percent of the watershed was burned with high or moderate vegetation burn severity the elevated risk is assumed to be acute and will recover in two to five years.

Spatial and Temporal Context

The spatial scale for the landslide risk and cumulative effects analysis is the 7th field watershed because the models used for analysis are calibrated at the 7th field scale. The temporal scale is from the present to ten years for short-term and 10 to 50 years for long-term. Elevated landslide rates due to forest management in Northern California have been shown to begin to decrease around 7 to 12 years after a disturbance and recover in about 50 years (Ziemer 1981).

Affected Environment

The Beaver portion of the project area is mainly underlain by Condrey Mountain Schist bedrock. The schist contains graphite (which is commonly used as a lubricant) which makes the area susceptible to large scale deep-seated landslides. The large dormant landslide deposits in the Beaver fire area are due to a combination of the graphitic schist and past climatic and seismic activity (more than 1,000 years ago). There are small portions of dormant landslide deposits that have experienced active landsliding in recent history (less than 100 years).

The Happy Camp portion of the project area has three distinct geologic types. The Elk Creek area is primarily metasedimentary and metavolcanic bedrock. These areas have few landslides and the primary landslide mechanism is debris flow of sediment stored in the stream channels. There are areas of ultramafic rock that have small dormant landslides but few have active landslides within them. The Grider/Walker Creek area is underlain by highly weathered and dissected granitic lands. The watersheds are susceptible to shallow landsliding such as debris slides and debris flows. The Tompkins Creek area is underlain by a mosaic of bedrocks including ultramafic, granitic and metasedimentary bedrock. The actual landslide rate is low with only a handful of active landslides in the area.

The Whites portion of the project area is mainly underlain by metasedimentary and metavolcanic bedrock. These rocks are ancient ocean floor and tend to be fairly stable (low landslide potential). The headwaters of Music Creek and Taylor Creek are underlain by granitic bedrock which has been highly weathered. This led to the development of highly weathered and dissected granitic lands, susceptible to shallow landsliding such as debris slides and debris flows.

Of the sixty-seven 7th field watersheds analyzed for this project, three currently have a very high landslide risk. These are Rancheria Creek, Walker Creek and Lower Grider Creek. The likelihood that a landslide event will occur in Lower Grider and Walker Creek is almost certain and highly likely in Rancheria Creek. These three watersheds have a catastrophic consequence if a landslide (specifically a debris flow) occurs due to the proximity to the creek of private property with residential structures. There are twenty watersheds with a high landslide risk mainly due to the susceptibility of municipal water supplies, fish habitat and access to landslide events. Thirty of the watersheds analyzed have a moderate landslide risk and twelve have a low landslide risk.

There are forty 7th field watersheds that have more than 10 percent high or moderate vegetation burn severity. These watersheds will have an elevated landslide risk of greater than 80 years. These include Rancheria Creek, Lower Grider Creek, and Walker Creek which have very high landslide risks and thirteen of the watersheds with high landslide risks. The other twenty seven watersheds are assumed to have acute elevated landslide risk that will last about two to five years. Maps of the geomorphology and bedrock are in the Geology resource report on the project website.

Environmental Consequences

Alternative 1

Direct Effects and Indirect Effects

There are no direct effects to landslide risk under this alternative. The area will recover naturally including the re-establishment of vegetation and ground-cover, increasing root support and intercepting precipitation which reduces landslide risk and potential. However, prolonged hardwood and brush dominated occupancy will not provide the root support to maintain stable slopes (Jackson and Roering 2009**)**. The landslide risk will remain the same as current conditions for about 10 to 12 years (Zeimer 1981) and slowly begin to reduce as conifer forest begins to be established. The project area may take up to 80 years to recover to a pre-fire landslide risk level. It could take longer in areas where seed sources have been eliminated due to large pockets of high and moderate severity vegetation burn such as Walker, Grider and O'Neil Creek.

Cumulative Effects

The projects added to the effects of the past actions (the affected environment) and the direct and indirect effects of the project are portions of the Jess project, Scott Bar Underburn, Lovers Canyon, McCollins and Sawyers Bar Fuels Reduction Project that are in the 7th field watersheds analyzed. The Jess project and Lovers Canyon project are the only two future projects that have any effect on the risk ratio or percent watershed with high or moderate disturbance. Jess project increases the risk ratio for 0.01 and 0.07 for the Eddy Gulch and Jessups Gulch respectively. The Jess project increases the percent of the watershed with high and moderate disturbance by 1.5 percent for both watersheds. Lovers Canyon increases the risk ratios for South Fork Kelsey and Middle Creek by 0.03 and 0.02 respectively, and the percent disturbed is increased by 3.3 percent for both watersheds. The landslide risks are not increased by the addition of the effects of these projects. None of the projects affect the duration of elevated risk in the watersheds.

Alternative 2

Direct Effects and Indirect Effects

There are about 3,920 acres of salvage units (about 2,000 acres of salvage logging) on steep, weathered granitic lands (Riparian Reserve) proposed in this alternative. No salvage will occur on inner gorges, active landslides or toe zones of dormant landslides (see chapter 2 for project design features). Also proposed are about 960 acres of site preparation and planting, 4,395 acres of roadside hazard tree removal and 3,940 acres of fuels treatments on unstable lands considered to be Riparian Reserves.

Alternative 2 does not change the landslide risk for any watershed. There is a change in the risk ratio or the percent of watersheds with high or moderate disturbance for twenty-eight watersheds due to treatments. The average change in risk ratio is 0.01 and the maximum change was 0.11. The average change in percent of the watershed with high and moderate disturbance is 0.24 percent and the maximum change is 1.1 percent.

There is a reduction in the duration of elevated risk due to planting for nine watersheds compared to alternative 1. The 7th field watersheds with a high landslide risk that will have a reduced duration of elevated risk are Upper Grider Creek, Cliff Valley, Lower Grider Creek, O'Neil Creek, Walker Creek, and Caroline Creek. The reduction in duration of elevated risk will benefit natural resources and infrastructure in the long-term. Middle Creek, Horse Creek, and Upper Elk Creek have a moderate landslide risk and will have a duration of elevated risk of 30 years in this alternative. Lower Grider and Walker Creek have very high landslide risk due to the potential to impact private land – so the reduction of elevated risk from more than 80 years to 30 years is of great benefit for protecting human safety and private property in these two watersheds. Rancheria Creek, which also has a very high landslide risk, will continue to have a greater than 80-year duration of elevated risk because there is less than 25 percent of the high and moderate vegetation burn severity areas being planted. All other watersheds will have a greater than 80 year duration of elevated risk.

Cumulative Effects

The projects added to the effects of the past actions (the affected environment) and the direct and indirect effects of the alternative are portions of the Jess project, Salmon Reforestation, Scott Bar Underburn, Lovers Canyon, McCollins and Sawyers Bar Fuels Reduction Project that are in the 7th field watersheds analyzed. The Jess project and Lovers Canyon project are the only two future projects that have any effect on the risk ratio or percent watershed with high or moderate disturbance. Jess project increases the risk ratio for 0.01 and 0.07 for the Eddy Gulch and Jessups Gulch respectively. The Jess project increases the percent of the watershed with high and moderate disturbance by 1.5 percent for both watersheds. Lovers Canyon increases the risk ratios for South Fork Kelsey and Middle Creek by 0.03 and 0.02 respectively and the percent disturbed is increased by 3.3 percent for both watersheds. The landslide risks are not increased for any 7th field watershed by the addition of the effects of these projects. None of the projects affect the duration of elevated risk in the watersheds.

Alternative 3

Direct Effects and Indirect Effects

There are about 3,750 acres of salvage units (about 1,900 acres of salvage logging) on steep, weathered granitic lands (Riparian Reserve) proposed in this alternative. No salvage will occur on inner gorges, active landslides or toe zones of dormant landslides (see chapter 2 for project design features). Also proposed are about 960 acres of site preparation and planting, 4,395 acres of roadside hazard tree removal and 3,940 acres of fuels treatments on unstable lands considered to be Riparian Reserves.

The indirect effects to the landslide risk are the same as for alternative 2. The duration of elevated risk will not be reduced in Horse Creek, because the percent of the 7th field planted drops below 25 percent. All other durations of elevated risk will remain the same as alternative 2.

Cumulative Effects

The cumulative effects are the same as for Alterntive 2.

Alternative 4

Direct Effects and Indirect Effects

There are about 3,740 acres of salvage units (about 1,900 acres of salvage logging) on steep, weathered granitic lands (Riparian Reserve) proposed in this alternative. No salvage will occur on inner gorges, active landslides or toe zones of dormant landslides (see chapter 2 for project design features). Also proposed are about 960 acres of site preparation and planting, 4,290 acres of roadside hazard tree removal and 3,940 acres of fuels treatments on unstable lands considered to be Riparian Reserves.

The indirect effects to landslide risk are the same as for alternative 2. There are only five 7th field watersheds that have a reduction in the duration of elevated risk. Lower Grider will have an elevated risk for more than 80 years under this alternative compared to 30 years in alternative 2. Upper Grider Creek, Horse Creek, and Upper Elk will have an elevated risk for more than 80 years compared to 30 years under alternative 2. All other durations of elevated risk are the same as alternative 2.

Cumulative Effects

The cumulative effects are the same as for Alternative 2.

Alternative 5

Direct Effects and Indirect Effects

There are about 465 acres of salvage units (about 250 acres of salvage logging) on steep, weathered granitic lands (Riparian Reserve) proposed in this alternative. No salvage will occur on inner gorges, active landslides or toe zones of dormant landslides (see chapter 2 for project design features). Also proposed are about 960 acres of site preparation and planting, 4,395 acres of roadside hazard tree removal and 3,970 acres of fuels treatments on unstable lands considered to be Riparian Reserves.

The indirect effects for landslide risk are the same as for alternative 2. The duration of elevated risk is the same as for alternative 4.

Cumulative Effects

The cumulative effects are the same as for Alternative 2.

Compliance with law, regulation, policy, and the Forest Plan

The project is compliant with the Klamath National Forest Plan (1995, as amended) Standards and Guidelines. A geologic investigation was completed and natural regeneration of vegetation on unstable lands will improve slope stability in portions of the project area but recovery could take between 30 and 80 years.

Air Quality

The purpose of this section is to analyze the effects of the project and its alternatives on air quality including ambient air quality standards.

Methodology

Analysis Indicators and Methodology

Compliance with the General Conformity Rule of the Clean Air Act for nitrogen oxides must be analyzed for this project. The conformity rules apply only to the activities occurring in the federal non-attainment areas and makes exceptions for activities with emissions considered to be less than "*de minimis*" values. The *de minimis* for nitrogen oxide emissions is 100 tons per year. The average emissions of nitrogen oxides are estimated through the use of the First Order Fire Effects Model (FOFEM).

The analysis will include an evaluation of the estimated residence time of smoke from project activities and its impact to the worst days haze to determine compliance with the Regional Haze Rule (40 CFR Part 51). Compliance with the Regional Haze Rule requires that states make reasonable progress towards achieving natural visibility conditions in Class I areas. The reasonable progress means that the worst haze days get less hazy and that visibility does not deteriorate on the best days, when compared with the baseline period of 2000 to 2004 (California Air Resource Board 2009). Federal agencies should not prevent this progress through management activities. Methodology is discussed in detail in the Air Quality resource report, available on the project website.

The analysis on roadless resources will focus on the effects to the roadless character, specifically the sense of solitude due to smoke emissions outside of normal wildfire season.

The Council on Environmental Quality recommends that Federal agencies disclose in documentation of their NEPA analyses the effects of climate change for actions that are estimated to emit more than 25,000 metric tons of carbon dioxide equivalents annually (Council on Environmental Quality 2014). This is not a threshold for adverse effects but rather a trigger point for when an analysis of greenhouse gas emissions is needed.

Spatial and Temporal Context

For this project, the spatial boundary includes the project area, the local communities, inventoried roadless areas, and the Marble Mountain Wilderness. Temporally, emissions from mobile sources such as logging trucks and tractors, as well as from prescribed burning, are transient and the impacts are short-lived and the air quality regulations are in terms of one-year emissions. The temporal analyses are on an annual basis and considered short-term. Impacts are considered long-term if they persist for more than a year. The cumulative effects of the mobile source emissions, fugitive dust and smoke emission will be addressed on the 7^{th} field watershed scale.

Affected Environment

The project area is primarily forested federally managed lands with no substantial human-caused emission sources within the area other than emission and fugitive dust from logging and recreation. Other emission contributions will be smoke and haze from seasonal wildland and prescribed fires from both within and outside the county. According to the California Air Resources Board (http://www.arb.ca.gov/app/emsinv/emssumcat.php) the nitrogen oxide emissions are primarily from heavy-duty diesel trucks (such as from the I-5 corridor).

The project is adjacent to the Marble Mountain Wilderness which is designated as a Class I wilderness by the Clean Air Act. The project is adjacent to the Russian Wilderness; however, this is a Class II wilderness and is not subject to the regional haze rule. The worst air quality days are dominated by organic aerosols (particulate matter associated that cause a haze in the air). Organic aerosols peak during the summer months and are strongly correlated with the incidence of wildfires **Invalid source specified.**.

Environmental Consequences

Alternative 1

Direct Effects and Indirect Effects

Under this alternative no management action will be taken that will emit nitrogen oxides, greenhouse gases, or impact the visibility in the Marble Mountain Wilderness.

Cumulative Effects

There are no direct or indirect effects for this alternative and therefore no cumulative effects.

Alternatives 2, 3 and 4

Direct Effects and Indirect Effects

The emissions from mobile emissions sources related to the project (trucks, heavy equipment, helicopters, chainsaws, etc.) will be about 26 tons. It is assumed that all of the salvage will occur in one year. The First Order Fire Effects Model estimates there will be about 5 pounds per acre of nitrogen oxides emitted during prescribed burning of activity fuels. There is about 16,245 acres of prescribed fire. It is assumed that 20 percent of the prescribed fire will be implemented in any given year. So the emissions from prescribed fire will be 8 per year. This means the project will not emit more than about 34 tons of nitrogen oxide emissions per year. This is less than the *de minimus* of 100 tons per year maximum allowed to meet regulations in the Conformity Rule.

The prescribed fire proposed in the project area will occur over a few days of any given year. Burning will occur in the spring or fall, outside of the wildfire season. Since the wildfire season is the time of the year when haze is at its worse, the project won’t impact visibility on the worst haze days. The likelihood that prescribed burning on a few days any given year will affect the average visibility on the best days over an entire year is small. The likelihood of preventing the progress of the Regional Haze Plan is very low for this alternative. The likelihood of impacting inventoried roadless character is low, smoke is common in the project area from natural sources and the effects are transient.

The greenhouse gas analysis uses the same assumptions as the Ambient Air Quality Standards analysis. Every acre burned will emit approximately 14 metric tons of carbon dioxide equivalents. This alternative proposes prescribed fire on about 16,250 acres of activity fuels. This analysis assumes that 20 percent of the proposed prescribed burning (or about 3250 acres) will occur in any given year. Therefore, the greenhouse gas emissions from prescribed fire will be about 45,500 metric tons of carbon dioxide equivalents annually. The emissions from heavy equipment (including yarders, loaders and log trucks) will be about 84 metric tons of carbon equivalent per vehicle or about 840 metric tons per year. Helicopter yarding will emit about 186 metric tons per year of carbon dioxide equivalents. Together the total greenhouse gas emission from the alternative will be about 46,525 metric tons per year.

Cumulative Effects

Adding the effects on air quality of alternative 2 to effects of ongoing or reasonably foreseeable future actions in the project area is expected to provide minimal cumulative effects with the oversight of the Siskiyou County Air Pollution Control District. Criteria pollutant and greenhouse gas emissions will degrade air quality cumulatively with activities occurring in the surrounding area. However, these emissions are expected to be minimal and able to disperse readily. Compliance with Burn Day, Marginal Burn Day, and No Burn Day designation, and coordination with and permitting from the Siskiyou County Air Pollution Control District, will minimize cumulative effects of prescribed fire.

Alternative 5

Direct Effects and Indirect Effects

The effects of Alternative 5 are the same as for Alternative 2, 3 and 4 except there are 17,455 acres of burning proposed. This is about 8.7 tons per year of nitrogen oxides emitted from prescribed burning. There is also about 30 percent the amount of salvage activities in Alternative 5 than in the other alternatives. So the emissions from heavy equipment are expected to be 30 percent of the other alternatives which is about 7.5 tons per year. The helicopter yarding will emit about 0.3 tons per year for this alternative. The total nitrogen oxide emissions are estimated to be 16.5 tons per year. The likelihood of the progress of the Regional Haze Plan will remain the same as in Alternative 2. The effects to the inventoried roadless character are the same as for alternatives 2, 3 and 4. Greenhouse gas emissions will be 49,180 metric tons of carbon dioxide equivalents.

Cumulative Effects

The cumulative effects are the same as in alternative 2.

Compliance with law, regulation, policy, and the Forest Plan

All alternatives are compliant with the Clean Air Act and the Conformity Rule. The project will not prevent the progress of the State of California’s Regional Haze Plan as required by the Regional Haze Rule, and will be consistent with the Forest Plan as displayed on the Forest Plan consistency checklist, available on the project website.

Cultural Resources

The purpose of this section is to analyze the Westside Fire Recovery Project in sufficient detail to determine its effects on properties included in or eligible for the National

Register of Historic Places (NRHP). This analysis is required under Section 106 of the Historic Preservation Act of 1966, as amended and is accomplished by the Klamath National Forest (Forest) under the Programmatic Agreement Among the USDA Forest Service, Pacific Southwest Region (Region 5), California State Historic Preservation Officer, Nevada State Historic Preservation Officer and the Advisory Council on Historic Preservation (Regional PA) and the Programmatic Agreement Among the Klamath National Forest, California State Historic Preservation Officer and the Advisory Council on Historic Preservation for the Westside Fire Recover Project (Westside Fire Recovery PA).

Detailed descriptions of the project alternatives are found in chapter 2.

Methodology

The National Historic Preservation Act of 1966 as amended "requires federal agencies to take into account the effects of their undertakings on historic properties." This is accomplished through a four-step process following 36 CFR Part 800, the implementing regulations for Section 106 of the National Historic Preservation Act. The regulations allow alternative procedures for meeting Section 106 to be developed through programmatic agreements. The Pacific Southwest Region of the Forest Service (Region 5) which includes the Forest has entered into a programmatic agreement for complying with Section 106. Additionally, the Forest developed the Westside Fire Recovery PA to address project specific issues and concerns. The Westside Fire Recovery PA allows limited project activities to occur within certain historic properties without adverse effects, as long as project-specific Standard Resource Protection Measures (SRPMs) are applied. The Westside Fire Recovery PA--developed in consultation with the California State Historic Preservation Officer, the Advisory Council on Historic Preservation, and local tribes--tiers to the Regional PA and meets the requirements for compliance under Section 106 of the National Historic Preservation Act.

There are two key parameters for analyzing effects to historic properties. The first parameter is defining an Area of Potential Effect. 36 CFR 800.16(d) defines the Area of Potential Effect, which is essentially the area within which project activities are expected to occur that may affect historic properties. By delineating the area within which effects are anticipated to occur, the scope of analysis is established. The second parameter is determining whether historic properties are present or identified within the Area of Potential Effect. Identification is a three-step process of pre-field research, field surveys, and consultation.

Once the Area of Potential Effect is defined and historic properties within the Area of Potential Effect identified, analyses are conducted to determine if the proposed project will directly or indirectly cause changes in the character or use of the historic properties. If no historic properties are present, there will be no adverse effects. If historic properties are present and any potential adverse effects can be mitigated through project design features or SRPMs, historic properties will not be adversely affected. If historic properties are present and potential adverse effects cannot be mitigated through management or SRPMs, the Forest will prepare a Historic Property Treatment Plan that will stipulate the actions the Forest will take to resolve the effects.

Analysis Indicators

Indicators for analyzing project effects on historic properties are (1) the number of historic properties in the project area that are at risk from project activities and (2) the degree (level) to which the integrity of historic values of these properties may be diminished by the project activities. Direct and indirect effects, as well as the effects of reasonably foreseeable future actions (cumulative effects), that may diminish the integrity of historic properties identified in the area of potential effects are analyzed.

At-risk historic properties are those that are significant and retain integrity and have been identified as being susceptible to adverse effects by specific undertaking activities. The degree to which an at-risk historic property's integrity is diminished by project activities is indicated by relative degree within four categories - negligible, minor, moderate or major. If the project activities would change one or more of the character-defining features and diminish the integrity of the resource to the extent that it would no longer be eligible for listing on the NRHP, the effects would be adverse (the degree of change would be moderate or major). Adverse effects to sites must be resolved in consultation with the State Historic Preservation Office.

Spatial and Temporal Context

Spatial boundaries for the analysis of effects are the Area of Potential Effect as defined by the National Historic Preservation Act and its implementing regulations (36 CFR Part 800). The Area of Potential Effect for this project includes areas within the project area boundaries where treatment activities are proposed and areas used in support of treatment activities. This Area of Potential Effect was chosen because this is the area potentially affected by project activities. Temporal boundaries for the short term are based on the effect being anticipated to occur during or within one to five years of implementation. Long-term effects will occur after the first five years following implementation.

Affected Environment

The affected environment for the Westside Fire Recovery Project broadly consists of steep, rugged mountains, incised by numerous rivers and creeks. The isolating effects of this landscape have resulted in a diversity of natural resources that have been sought and used by humans for thousands of years. Evidence of past use is spread across the project area but is concentrated into those areas people used most intensively, such as terraces, benches, areas along the rivers and their tributaries and areas where resources such as plants, animals or mineral were exploited relatively easily. A record of human presence is found across the landscape in the material remains left behind which comprise a record of irreplaceable and non-renewable resources related to past human life and land use. This record is includes historic properties as well as locations of cultural importance to local Native American groups.

Although few archaeological investigations into the prehistory of the project area have been conducted, Pilot Ridge, the foundational study for the interior North Coast Ranges revealed evidence of 8,000 years of human occupation and highlighted a forager subsistence- settlement pattern that required frequent moves of entire social units to locate resources. Archaeological site distributions shifted over time, in response to climatically induced vegetation shifts, and produced generalized artifact assemblages (Hildebrandt and Hays 2007).

The project lies within the ancestral territories of groups from the Shastean Complex, specifically the Scott River and Klamath River Shasta, as well as the Karuk Tribe. Like most tribes in California, the Shastean and Karuk people were engaged in a seasonal subsistence rounds. The people would foray out from permanent village sites throughout the year as resources became available for harvesting and processing. When resources had been procured, individuals and families would return to the village sites and store the supplies for future use. The project area has numerous culturally significant plant stands (e.g. tanoaks, bear grass, hazel, huckleberry) within and adjacent to natural openings, plantations and meadow areas. Important species were often managed and enhanced by tribes through the use of fire.

Euro-Americans entered into Siskiyou County in 1827, with regular forays into the area by the early 1840s. With the 1851-1852 gold strikes, the gentler-slopes/lower-elevations of the Klamath Mountain watersheds steadily became transformed into an intensively exploited and densely populated landscape. By the 1870s, large-scale hydraulic mining of the region’s placer deposits began. From the 1870s into the early twentieth century, systems of high ditches, head boxes, iron-pipe penstocks, “giant” nozzles, huge sluice systems, and the other accoutrements of “hydraulicking” transformed many of the project-area’s stream bottoms into a landscape of vast, linear ‘washing pits’ (the mined-out areas of ancient alluvium) located within, adjacent, and parallel to the stream courses. The project area encompasses portions of several historic mining districts.

Livestock operations arose in support of the miners and later expanded as fluctuating mining populations stabilized and communities became more settled. With the creation of the National Forest Preserves in 1905, most of the project area became part of the Klamath National Forest. By the 1950s the timber industry assumed a prominent role in the use of the landscape. During its prominence, until the passage of environmental laws in the late 1960s and early 1970s, this industry extracted vast stands of timber from the Forest, the effects of which are still visible across the landscape. Recreation in the form of hunting, fishing, rafting, hiking and camping has been and continues to be a key component of the land use within the project area.

Approximately 75 percent of the Area of Potential Effect has never been surveyed for historic properties, though about 80 percent of this area has slopes greater than 30 percent. There are 159 recorded sites within the Area of Potential Effect. At the time of publication, no Traditional Cultural Properties or Scared Sites had been identified within the Area of Potential Effect. Most, if not all, archaeological sites within the project area have been affected to some degree by various agents of disturbance, whether environmental processes, land management actions and/or public use.

Environmental Consequences

Using the analysis indicators outlined above, each alternative is considered based on the proposed management actions and their potential level of effects to historic properties and cultural resources. If an action alters in any way the characteristics that qualify the property or resource for inclusion on the NRHP, it is considered to have an effect. An effect can be direct or indirect, beneficial or adverse. Effects are “adverse” when the alterations diminish one or more of the seven elements of a historic property's integrity (location, design, setting, materials, workmanship, feeling, or association). The degree (level) to which the integrity is diminished by the proposed actions are classed into four categories that are based upon relative degree – negligible, minor, moderate, major. A "no adverse effect" occurs when the project has an effect on the resource but is not harmful to the characteristics that qualify the resource for inclusion on the NRHP. A finding of "no adverse effect" may also occur if the effects of the proposed project can be reasonably predicted and project design features or SRPMs can be used to avoid or minimize potential adverse effects to historic properties (Regional PA, Stipulation 7.8(b). SRPMs are provided in the Regional PA, Appendix E; additional project-specific SRPMs are provided in the Westside Fire Recovery PA.

Under the National Historic Preservation Act, Section 304 and the Archaeological Resources Protection Act of 1979, Section 9a, the disclosure of information revealing the location or character of historic or archaeological resources is prohibited when this information would open the resources or their settings to a substantial risk of harm, theft, or destruction. Therefore, discussion of the effects of this project is generalized to types of historic properties and cultural resources rather than individual properties or resources. Project design features are sufficient to protect these resources while not disclosing their locations. Management and/or SRPMs are prescribed at the individual property or resource level and are documented in the Archaeological Survey Report for this project (R2014-05-05-2188-0).

Alternative 1

Direct Effects and Indirect Effects

There would be no direct effects to archaeological sites because no management actions would be implemented. However, there would also be no actions taken in the project area to reduce fuels or fire-weakened trees from within and around archaeological sites. Tree-mortality, such as that resulting from wildfires, puts historic properties and cultural resources at risk. When trees are left to fall naturally, these trees may damage or destroy site features or displace the same when uprooting (e.g. rock walls, house pits). The effects of tree fall are often compounded by erosion which can bury or displace cultural deposits, fuel loading if left on the ground (see below), and accelerated decay as previously unexposed surfaces become exposed. Lack of road roadside hazard treatments may also affect linear resources through erosion, and blowouts where culverts are plugged creating negative effects to morphological features. Therefore, a possible indirect adverse effect resulting from alternative 1 is the continued risk of damage to sites from wildfire, tree fall and erosion. At particular risk are large scale historic mining sites (tens to hundreds of acres) consisting primarily of earthen and rock features (e.g. hydraulic headwalls, ditches, raceways, waste-rock piles, processed sediment deposits, roads, etc.). The indirect, short-term effects to archeological resources would be negligible but indirect, long-term effects would be moderate to major.

There would be no direct effects to traditional use areas because no management actions would be implemented. However, fire-adapted plants may not be enhanced if low intensity prescribed fire is not used in the project area. The result is indirect adverse effects through the long-term degradation or loss of these species that then reduces opportunities for tribal members for gathering, hunting and other subsistence opportunities over time. These effects would be moderate to major.

Cumulative Effects

Under alternative 1, fuels loads will increase through time and increase the potential for high intensity and high severity wildfires. High intensity fire within the project area will destroy features/components of sites and as fire-weakened trees continue to fall, the damage and destruction of these effects will continue to accumulate. Additionally, the lack of roadside hazard treatments may result in increased erosion and plugged culverts, especially after high precipitation events. High intensity fire, widespread tree fall, erosion and blowouts would result in the loss of NRHP values to archaeological sites, and result in a moderate to major effects. The degradation of traditional-use areas and plants will accelerate over time, resulting in the loss of culturally important places and plant communities. With these losses, the ability for local tribal communities to sustain their traditions and cultures is compromised. The cumulative effects would be moderate to major.

Alternative 2

Direct and Indirect Effects

Alternative 2 includes actions that have the potential to effect 159 previously recorded historic properties and an unknown number of unrecorded historic properties and cultural resources.

Salvage Harvest and Roadside Hazard Tree Removal

There would be no direct effects to historic properties as the result of salvage harvest and roadside hazard tree removal because actions would not be, for the most part, implemented within the boundaries of these sites. The Westside Fire Recovery PA allows limited project activities to occur within the boundaries of certain types of historic properties. For example, harvest activities will be allowed when implemented from existing roads within historic archaeological sites following SRPM and project design features as will the use of specific types of existing landing (e.g. located within the debris field of large hydraulic mines). However, even when using SRPMs and project design features to reduce the risk of adversely affecting historic sites, the potential for direct effects still exists if there is subsurface material present (when operating within site boundaries). While a site locality is recorded to the archaeologist’s best ability, the possibility of unrecorded material can still exist, especially if the site has not been tested. The need to create as little ground disturbance as possible can prevent potential subsurface artifacts, if present, from exposure, displacement or damage.

The removal of dead and dying trees from within and adjacent to historic properties and cultural resources results in direct and indirect beneficial effects; these effects are moderate to major in both the short and long term.

Fuels Reduction

There would be no direct effects to historic properties as the result of fuels reduction because actions would not be, for the most part, implemented within the boundaries of these sites. Prescribed fire will not occur within site boundaries, and other types of fuel reduction, if occurring in site boundaries will be conducted under the provisions of the

Regional PA. For example, brush would be removed by hand and piled outside of the site boundaries.

The use of SRPMs to reduce or mitigate adverse effects to historic properties and cultural resources may however foster conditions that result in indirect effects. By avoiding or not treating within site boundaries, a higher fuel load is left within the site compared to surrounding areas. Intense fire may damage or destroy combustible artifacts or permanently alter materials susceptible to heat or flame within a site. Not only do “leave” areas increase the risk that future fires will burn with higher intensity within a site’s boundary, they direct the public’s attention to these areas which may result in increased looting and vandalism. These indirect adverse effects to historic properties are minor in the short term but moderate to major in the long term.

Any identified traditional-use areas, if left unmanaged or avoided, often become choked with brush and downed fuels, which limit their potential use and the quality and/or quantity of any materials sought at these locations. Without fire, these areas may also lose important settings and viewsheds, rendering them unsuitable for use in cultural practices. These indirect adverse effects to historic properties are minor in the short term but moderate to major in the long term.

Site Preparation and Planting

Site preparation and planting activities create significant ground disturbance which would result in direct adverse effects to historic properties and cultural resources if allowed to occur within site boundaries. As such, SRPMs and project design features will be used to prevent these activities from occurring within site boundaries. There will be no direct or indirect adverse effects as the result of site preparation and planting, in either the short or long term.

Cumulative Effects

Reducing the likelihood of a high intensity wildfire through proposed actions within the Area of Potential Effect, combined with similar types of other projects already implemented or implemented in the reasonably foreseeable future, will result in a cumulatively beneficial effect to historic properties and cultural resources that are moderate to major. However, for those historic properties and cultural resources avoided by treatments both under the proposed actions and by actions in the reasonably foreseeable future, there will be moderate to major cumulative effects.

Alternatives 3, 4 and 5

Direct and Indirect Effects

The direct and indirect effects of alternatives 3, 4 and 5 are essentially the same as the effects described under alternative 2.

Cumulative Effects

The cumulative effects of alternatives 3, 4 and 5 are the same as the effects described under alternative 2.

Comparison of Effects

Under alternative 1, there would be no direct effects to historic properties or cultural resources because no management actions would be implemented. There would be moderate indirect, short-term effects to historic properties, and moderate to major indirect long-term effects to historic properties and cultural resources.

Under alternatives 2, 3, 4 and 5, there would be no direct adverse effects from project activities in the short or long term; there would be direct beneficial effects as the result of salvage harvest and roadside hazard tree removal. Indirect adverse effects are created when historic properties and cultural resources are avoided, thereby creating “leave” islands. These effects are minor in the short term but moderate to major in the long term. Indirect beneficial effects result in both the short and long term as the likelihood of damage and destruction to resources is decreased when dead trees are salvaged and fuel loads reduced in the surrounding areas.

Reducing the likelihood of a high intensity wildfire and tree-fall within the Area of Potential Effect, combined with similar types of other projects already implemented or implemented in the reasonably foreseeable future will result in a cumulatively beneficial effect to historic properties and cultural resources that are moderate to major. However, for those historic properties and cultural resources avoided by treatments both under the proposed actions and by actions in the reasonably foreseeable future, there will be moderate to major cumulative effects.

Compliance with law, regulation, policy, and the Forest Plan

All action alternatives adhere to applicable heritage resource laws, regulation, policy, and the Forest Plan). Documentation of the effects of each alternative in this report meets legal compliance. The Forest Plan consistency checklist, displayed on the project website, identifies the Forest Plan Standards and Guidelines that apply to this project and related information about compliance with the Forest Plan.

The Native American Graves Protection Act of 1990, Executive Order 13007, entitled Indian Sacred Sites, and Executive Order 13175, entitled Consultation and Cooperation with Indian Tribal Governments provide direction on the protection of cultural resources in federal land management decisions. Both federally recognized and non-federally recognized tribes were contacted early in project planning and were engaged throughout the planning process, in accordance with the National Historic Preservation Act, NEPA and other laws, regulations and policy. Tribal engagement is summarized in chapter 1, *Public Involvement*. Consultation was conducted with the Karuk Tribe, Quartz Valley Indian Reservation, and the Confederated Tribes of the Siletz. The Forest conferred with the Shasta Indian Nation and the Shasta Nation, Inc.

Written and verbal comments received during tribal consultation were considered when refining the proposed action and while developing project alternatives; many tribal concerns were incorporated in these alternatives. Consultation with the tribes regarding the proposed project is on-going.

Social and Economic Environment

The purpose of this section is to analyze the effects of the Westside Fire Recovery project on rural social and economic health, and identify any disproportionate effects to minorities and disadvantaged groups in Siskiyou County. Safety is an important value to people in Siskiyou County; therefore, one purpose of this analysis is to gain a better understanding of how safety relates to the purpose and need of this project and its proposed actions. In particular, how safety of local residents, the recreating public, and forest workers such as firefighters and planting contractors are affected by the treatments being proposed.

Methodology

Social

Information from federal data sources is used to compare the social status of Siskiyou County to the State of California and the United States to provide background information for effects of the project on minorities and disadvantaged groups. The Economic Profile System – Human Dimensions Toolbox which compiles statistics from federal data sources is used as a source of information for this analysis.

Economic

Economic effects are analyzed using information from a customized version of an input-output model that summarizes inter-industry production and consumption for each state and county in the United States (IMPLAN). Since the data sources and methods used by IMPLAN are approximations of reality that sometimes contain substantial departures relative to actual conditions in the state or county, a customized model was developed (SCFSM) in 2012. This model customizes the standard Siskiyou County IMPLAN model to provide a more reliable representation of Siskiyou County's forest sector. It was developed primarily to support defensible analysis of the economic impacts of national forest projects in Siskiyou County and is used in the analysis of the Westside Fire Recovery project. More information on both the SCFSM and IMPLAN models is provided in the body of, and appendix to, the Socio-economic resource report.

Analysis Indicators

Social Environment

Social analysis is based on the quality of life of people affected by this project. Quality of life depends partly on the ability of people to sustain themselves and their families; that is analyzed in the economic portions of this document. The indicators used for the social analysis include lifestyles, values, beliefs, health and safety of individuals and communities. For this project, there are three measures for evaluating the effects of the project on quality of life for Siskiyou County residents:

- The value of using the resources of the Forest, and project area in particular, for the benefit of county residents (Siskiyou County Land and Resource Management Plan 1994). This will be analyzed using the estimated volume of timber products the alternatives will produce.

- Changes to the “fire-safe character of communities” in the project area. This will be analyzed using the acres of fuels treatments in each alternative. It is assumed that fuels treatments have the indirect effect of creating more fire-safe communities. Safety for Forest workers, firefighters and the public. This is estimated by the number of acres on which standing dead trees are removed by salvage harvest and by the number of miles and acres of roadside hazard trees removed (for those who use roads in and through the project area). Also see the discussion about resistance to control regarding fire suppression tactics in the Fire and Fuels section of this chapter 3.

Assumptions made in this analysis include that it is probable that any portion of the project area will be accessed by the public, firefighters or Forest workers. Hazard trees can directly harm a person or property but can also pose an indirect hazard such as blocking access to or from portions of the Forest or to major escape routes during storms or future wildfires.

Economic Environment

The Forest Plan includes a Forest-wide goal to promote the economic stability of local communities (Forest Plan page 4-9). Economic analysis indicators for this report are:

1. total economic outputs;
2. labor income (wages and proprietor’s income);
3. number of jobs created;
4. revenue generated based on the estimated volume from timber sale units; and
5. estimated project revenue returned to Siskiyou County.

Spatial and Temporal Context

Siskiyou County is used as the spatial analysis area for social effects and for fiscal effects (timber receipts) because the project area is entirely within the county. The model used to analyze other economic effects takes into account impacts within a four-county area including Siskiyou, Shasta and Trinity counties in California and Jackson County in Oregon because the project’s direct economic effects through the veneer manufacturing, logging, log hauling and forestry support services are realized through this larger area. The three fire-related project areas are used as the spatial analysis area for effects to safety because treatments proposed to improve safety are entirely within these project areas.

This analysis considers one to five years as the short-term time period for effects analysis on safety and other social and economic indicators. This temporal bounding approximates when treatments will be completed and most fire-killed trees are likely to fall, and when treatments will be completed and products from implementation will have entered the wood products market. Five to ten years is the long-term time period for effects analysis on safety and other social and economic effects.

Affected Environment

Social Environment

In terms of safety, the following conditions describe the affected environment:

- Trees killed or severely burned by wildfire (i.e. snags) are often unstable and at risk for falling or snapping off, especially during winter snow, rain, and high wind events.
- Infrastructure, including utility lines, roadways, bridges, trailheads, campgrounds, and fire lookouts within the project area, are surrounded by fire-killed and damaged trees and preexisting danger trees that pose a hazard to the public and Forest workers. As a result of the 2014 fires, infrastructure, including utility lines, roads, bridges, trailheads, campgrounds, and fire lookouts within the project area are surrounded by fire-killed and damaged trees and preexisting danger trees that pose a hazard to the public and Forest workers and restrict access. About 650 miles of roadways are affected.
- Dead and dying trees within proposed salvage harvest areas present a safety hazard to firefighters (should the area burn again) or others who may recreate or work in these areas.
- A high probability of future high-intensity wildfires (due to heavy fuel loading from existing fire-killed timber) threatens structures and presents a safety hazard to nearby residents and firefighters (should the area burn again). Progressively increasing fuel loads (where potential flame lengths exceed four feet) provides conditions in which fires are resistant to suppression tactics.

The closest communities to this project are the communities of Happy Camp, Seiad Valley, Yreka, Fort Jones, Etna, Klamath River, Scott Bar, Hamburg, and Sawyers Bar. Social effects of the project, including safety concerns, will be most noticeable in these communities and the surrounding rural areas of the county.

The Siskiyou County population consists of Caucasian, African American, American Indian, Hispanic, Asian, Native Hawaiian or Pacific Islander, and other races. The American Indian population is a greater percentage of the population in Siskiyou County than in the State of California; therefore, potential impacts of management actions on the American Indian population will be disclosed. A larger percentage of the population of Siskiyou County is unemployed or below the poverty line than in the state of California; the impacts of the project on low-income populations in Siskiyou County will also be disclosed.

Lifestyles, attitudes, beliefs and values of Siskiyou County residents are similar to those of rural residents in other counties in the western United States. Many local residents depend on the environment to support them, and they want forest products to be used for the benefit of the county. The concern regarding the fire-safe character of the communities in and adjacent to the project boundary and for the general safety of the public, forest workers and firefighters is addressed above. Conditions related to safety have changed in the last few years due to high intensity wildfires that have left many acres of the Forest in an unsafe condition and are of particular concern to communities within and adjacent to the project area boundaries.

Economic Environment

Labor income in Siskiyou County has held relatively constant since 1970; non-labor income has been on a steady rise.

From 1970 to 2011, employment grew from 14,085 to 20,224 jobs, a 44 percent increase over 1970. Since 1990, the annual unemployment rate ranged from a low of 7.5 percent in 2000 to a high of 16.6 percent in 2010. Siskiyou County unemployment rates tend to be higher than the rest of the United States.

In 1998, timber represented more than seven percent of total employment of Siskiyou County but by 2011, timber represented five percent of total employment, mirroring the trend in the United States as a whole. Jobs in the timber sector in the county decreased to 410 jobs in 2011. “Although National Forests account for more than 60 percent of the county’s land base, the share of the county’s timber harvest off federal lands has decreased from roughly 50 percent to less than 20 percent since the northern spotted owl was listed as threatened in 1990. Since 1990, the number of wood products manufacturing facilities in the county has declined by half” (Dennis 2012).

Siskiyou County has limited sawmilling (i.e., lumber production) capacity compared to the other counties in the four-county region. The main log-processing facilities in Siskiyou County are veneer mills. Siskiyou County’s veneer mills typically purchase relatively low-value logs and may produce relatively high-value wood products compared to sawmills. More information on the economic environment is provided in the body of, and appendix to, the Socio-economic resource report.

Environmental Consequences

Alternative 1

Direct Effects and Indirect Effects

Social and Economic

Under this alternative no project treatment activities are proposed. The social effects of this alternative will be a continuation of the current distribution of jobs among racial and ethnic groups. Alternative 1 will not contribute to timber employment jobs and the county’s economic situation will not be improved. There will be no disproportionate effects on American Indians or the poor.

The lifestyles, values and beliefs of the people in Siskiyou County will not be changed and the wish that resources of the Forest be used to benefit local residents will not be fulfilled. The concern regarding the fire-safe character of the communities will not be addressed because no project-related fuels treatments will be implemented.

The effect on safety of implementing alternative 1 will be that zero burned acres will be treated and zero miles of roadside hazard trees will be removed. This will increase the likelihood that forest workers, firefighters, or public users of Forest land will be injured by a fire-killed or hazard tree as time goes on and the trees deteriorate and fall down. Because no roadside hazard trees will be removed in this alternative, safe travel on roads within the fire area will be hindered year after year due to new trees falling into the roads or roads may need to be closed for various periods of time to assure public safety which will affect public access to the Forest. Fallen trees in the road may also delay the response of firefighting personnel to new wildland fires in and around the project area. Safety for Siskiyou County as a whole will decrease since the project area represents about 10% of the Siskiyou County land base.

Without treatment, hazards would not be abated around critical infrastructure.

- Salvage treatments would not be accomplished. Without salvage harvest, snags would continue to decay, break, and fall. This would increase surface fuel loading, which will increase the severity and intensity of future fires. Increased fire intensities and dead and decaying standing trees would inhibit the effective control of future fires and/or put fire suppression crews at increased risk. (See fuels and vegetation sections in this chapter.)
- Reforestation of burned forested areas would not be accomplished with this or any other project, since planting crews cannot safely operate in areas of dead and decaying standing trees. It is a violation of Office of Safety and Health Administration codes to plant or treat hazardous fuels under, or adjacent to, snags. Since there would also be fewer funds available from timber contract receipts, the opportunity to restore forested habitat through site preparation and reforestation work would be lost.
- In the short term, Forest workers such as firefighters, planters, researchers, and surveyors would either risk working in conditions that may subject them to injury or death from fallen snags or would not work in the areas because the areas would be deemed unsafe for work. In the long term, jack-strawed conditions from fallen snags would impeded effective travel through areas of high to moderate severity burns, which would put workers at increased risk or eliminate their ability to work in the areas.
- In the short and long term, no treatment of hazard trees along roadways and nearby infrastructure would increase safety risks to forest workers and the public. The number of fallen snags along roadways would be innumerable –far too many to be addressed by fire crews and through permitted public fuelwood removal. To mitigate safety risks to the public, Forest Orders may be needed temporarily to close road access to portions of the Forest, which would impact public access (see the Recreation section of this chapter).
- In the long term, increased fire intensities and the continued existence of dead and decaying standing trees would inhibit the effective control of future fires and/or put fire suppression crews at increased risk. See the Fire and Fuels section of this chapter for details.

Cumulative Effects

Ongoing and foreseeable future actions in the project area are listed in appendix C. Some projects, including projects with hazard tree and fuels treatments improve safety conditions for the public and forest worker. However, alternative 1 would not supplement other present and/or reasonably foreseeable future projects that are planned to improve safety across the landscape. Additionally, because of access issues resulting from fallen snags along roadways, difficulties may preclude future projects from either continuing or being planned due to the high density of snags within or adjacent to the project area. Using fire as a management tool in both the planned (prescribed fire) and unplanned setting may not meet desired resource objectives due to future fuel loading potential as well as the hazard, cost and time needed to remove decaying hazard trees from planned control lines. This will be a limiting factor in future prescribed fire activities.

For cumulative social and economic effects of indicators other than safety, all current and reasonably foreseeable similar actions within Siskiyou County over the next five years were considered; for this analysis, it is assumed that actions in the four-county area will be similar to those in Siskiyou County. Future foreseeable actions on National Forest System land within Siskiyou County are available on the Forest Service Schedule of Proposed Actions website: http://www.fs.fed.us/sopa/. These projects include the Salmon Salvage, Two Bit, Jess, Hotelling Roadside Hazard, Crawford, McCollins LSR, Eastend, Craggy, and Lover's Canyon projects on the west side of the Forest, Big Pony, Ruffed Grouse, Butte Mountain, Little Deer, Landlord, Pumice, Six Shooter, and Harlan projects on the eastside of the Forest, and the Harris project on the Shasta Trinity National Forest. A list of planned Timber Harvest Plans for California can be found at: http://calfire.ca.gov/resource_mgt/resource_mgt_forestpractice_thpreviewprocess.php.

Since it is difficult if not impossible to obtain detailed information on the amount of harvest expected or the economic value of such harvest, it is assumed that timber harvest on private lands will continue at a rate similar to the past. There are also a number of salvage projects on private land covered by exemptions from requiring a timber harvest plan.

Implementation of alternative 1 will neither support nor add to the demand for timber industry jobs and its related industries employment. Adding the social and economic effects of these projects to the effects of alternative 1 will not result in substantial social or economic cumulative effects.

Alternative 2

Direct Effects and Indirect Effects

Social

The social effects of this alternative will include more jobs available for Siskiyou county residents from the 2,236 additional jobs provided and a continuation of the current distribution of jobs among racial and ethnic groups. There will be no disproportionate effects on American Indians or the poor.

The lifestyles, values and beliefs of the people in Siskiyou County will include some fulfillment of the desire that resources of the Forest be used to benefit local residents. The concern regarding the fire-safe character of the communities will be addressed through fuels treatments on ridges and near communities.

Treatments will improve safety conditions within the project area include roadside hazard treatments, hazardous fuels treatments, and salvage harvest treatments.

A majority of hazards along 640 miles of roads and other infrastructure, including campgrounds, fire lookouts, trailheads, bridges would be treated in 2015 prior to winter weather operational restrictions. Since roadside hazard treatments are buffered to 250 feet on either side of the road, roadside hazard treatments incorporate bridges, campgrounds, fire lookouts, trailheads. Treatments will abate hazards along roadways and other infrastructure, improving safety conditions for the public and forest works and mitigating potential damages from falling fire-killed trees and other hazard trees. Hazard treatments along roadways are critical for providing safe and effective access for the public and forest workers. Treatments are also proposed along utility corridors where needed to protect infrastructure and improve conditions for fire suppression tactics. The removal of fire-killed trees and other hazard trees from around local communities, key infrastructure, and roads would also provide fire managers with improved options for effectively managing potential future wildfires.

Salvage harvest on 6,800 acres within 11,700 acres of salvage units would reduce safety hazards, promoting improved safety conditions for public and forest workers, including but not limited to firefighters, planters, and surveyors. By removing fire-killed trees before they fall and become “jack-strawed” and making foot travel feasible, safety conditions and suppression effectiveness for firefighters is improved.

Hazardous fuels treatments within fuel management zones (i.e. fuel breaks) and the wildland urban interface treatments also improve safety conditions of firefighters and improve suppression tactics around local communities, improving the safety conditions of local residents. Although fire plays an important role in the ecosystem, reducing these fuel loads minimizes the intensity and severity of future fires, thus improving the likelihood of firefighting success.

Proposed treatments decrease the likelihood that forest workers, firefighters, or public users of Forest land will be injured by a fire-killed or hazard tree as time goes on and the trees deteriorate and fall down. Safety for Siskiyou County as a whole will increase since the project area represents about 10% of the Siskiyou County land base.

Economic

Economic effects of alternative 2 include an economic output of $210,206,000, labor income value of $53,107,000, and employment increased by 1,236 jobs. Timber revenues from implementing this alternative are estimated at $11,892,000 and returns to Siskiyou County at $2,973,000 based on 25% of timber revenue receipts. Wholesale veneer value is estimated as $98,700,000, logging costs at $33,140,000 and hauling cost at $10,515,000. Required costs to restore the project landscape through site preparation, planting and fuels reduction are estimated as $36,460,000.

Cumulative Effects

As noted above, implementation of alternative 2 will have measureable social and economic effects on Siskiyou County; adding the social and economic effects of the ongoing and reasonable foreseeable future projects identified in alternative 1 to the effects of alternative 2 will result in noticeable social and economic cumulative effects, especially in the timber sector. Since this sector is such a small part of the economy of Siskiyou County, however, overall cumulative effects to the county are not expected to be substantial. In terms of safety, projects, especially those with hazard tree and fuels treatments, improve safety conditions for the public and forest workers. Treatments proposed in this project would supplement other present and/or reasonably foreseeable future projects that are planned to improve safety across the landscape. Roadside hazard treatments proposed in this project would provide access to other future projects within or adjacent to the project area, providing access for treatments. Using fire as a management tool in both the planned (prescribed fire) and unplanned settings would meet desired resource objectives due to lower future fuel loading potential and fewer hazards, providing conditions to improve the likelihood of suppression effectiveness. See the Fire and Fuels section of this chapter for details.

Alternative 3

Direct Effects and Indirect Effects

Social

Social effects will be similar to those of alternative 2 except that (1) safety will be affected by 5,800 acres of salvage logging within 9,600 acres of salvage units; and (2) 1,067 jobs are expected to be created. Effects of this alternative to improving safety will be similar to alternative 2 except that 5,800 acres will have large fuels removed through salvage harvest.

Economic

Economic effects of alternative 3 include an economic output of $185,381,000, labor income value of $46,523,000, and employment increased by 1,067 jobs. Timber revenues from implementing this alternative are estimated at $9,851,000 and returns to Siskiyou County at $2,463,000 based on 25% of timber revenue receipts. Wholesale veneer value is estimated as $87,000,000, logging costs at $29,807,000 and hauling cost at $9,260,000. Required costs to restore the project landscape through site preparation, planting and fuels reduction are estimated as $29,310,000.

Cumulative Effects

As noted above, implementation of alternative 3 will have measureable social and economic effects on Siskiyou County; adding the social and economic effects of the ongoing and reasonable foreseeable future projects identified in alternative 1 to the effects of alternative 3 will result in noticeable social and economic cumulative effects, especially in the timber sector. Since this sector is such a small part of the economy of Siskiyou County, however, overall cumulative effects to the county are not expected to be substantial.

Alternative 4

Direct Effects and Indirect Effects

Social

Social effects will be similar to those of alternative 2 except (1) safety will be affected by 5,900 acres being salvage logged within 10,200 acres of salvage units; and (2) 1,074 jobs are expected to be created. Effects of this alternative to improving safety will be similar to alternative 2 except that 5,900 acres will have large fuels removed through salvage harvest.

Economic

Economic effects of alternative 4 include an economic output of $189,564,000, labor income value of $47,338,000, and employment increased by 1,074 jobs.Timber revenues from implementing this alternative are estimated at $9,586,000 and returns to Siskiyou County at $2,396,000 based on 25% of timber revenue receipts. Wholesale veneer value is estimated as $88,900,000, logging costs at $30,940,000 and hauling cost at $9,463,000. Required costs to restore the project landscape through site preparation, planting and fuels reduction are estimated as $29,500,000.

Cumulative Effects

As noted above, implementation of alternative 4 will have measureable social and economic effects on Siskiyou County; adding the social and economic effects of the ongoing and reasonable foreseeable future projects identified in alternative 1 to the effects of alternative 4 will result in noticeable social and economic cumulative effects, especially in the timber sector. Since this sector is such a small part of the economy of Siskiyou County, however, overall cumulative effects to the county are not expected to be substantial.

Alternative 5

Direct Effects and Indirect Effects

Social

Social effects will be similar to those of alternative 2 except that (1) safety will be affected by 1,900 acres being salvage logged within 3,400 acres of salvage units and an additional 1,200 acres adjacent to private property will have fuels reduced; and (2) 549 jobs are expected to be created.

Economic

Economic effects of alternative 5 include an economic output of $83,752,000, labor income value of $21,932,000, and employment increased by 549 jobs. Timber revenues from implementing this alternative are estimated at $6,334,000 and returns to Siskiyou County at $1,583,000 based on 25% of timber revenue receipts. Wholesale veneer value is estimated as $39,500,000, logging costs at $11,712,000 and hauling cost at $4,214,000. Required costs to restore the project landscape through site preparation, planting and fuels reduction are estimated as $25,802,000.

Cumulative Effects

As noted above, implementation of alternative 5 will have some social and economic effects on Siskiyou County; adding the social and economic effects of the ongoing and reasonable foreseeable future projects identified in alternative 1 to the effects of alternative 5 will result in social and economic cumulative effects, including some in the timber sector. However, overall cumulative effects to the county are not expected to be substantial.

Comparison of Effects

The project’s economic effects on Siskiyou County and the four-county region will be largest under the alternative 2, about 12 percent smaller under alternatives 3 and 4, and about 50 percent smaller under alternative 5. The relative contributions of timber harvesting and landscape restoration to the project’s economic effects are given by their relative monetary values.

Table 3-25 displays a comparison of the social and economic effects of alternatives.

Table 3-25: Comparison of Social and Economic Effects of Alternatives

Indicator	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Economic Output	$0	$210,206,000	$185,381,000	$189,564,000	$83,752,000
Labor Income	$0	$53,107,000	$46,523,000	$47,338,000	$21,932,000
Employment (Jobs)	0	1,236	1,067	1,074	549
Timber Sale Revenue	$0	$11,892,000	$9,851,000	$9,586,000	$6,334,000
Meets local social value for use of resources (potential revenue to county)	$0	$2,973,000	$2,463,000	$2,396,000	$1,583,000
Fuels Management Zones	0	4,800	4,800	4,800	6,000
Roadside Fuels Treatments	0	4,400	4,400	4,400	4,400
Wildland Urban Interface Treatments	0	2,200	2,200	2,200	2,200
Salvage Harvest Treatments	0	6,800	5,800	5,900	1,900
Roadside Hazard Treatments	0	9,000	9,000	8,000	9,000
Total Acres Treated to Improve Safety Conditions	0	27,200	26,200	25,300	23,500

All action alternatives will address priority treatment areas for safety. Consequently, effects to safety are only incrementally different among action alternatives, differing only by the acres of salvage harvest treatments proposed.

Compliance with law, regulation, policy and the Forest Plan

Actions are consistent with the Forest Plan. Forest Plan management goals and standards and guidelines related to safety include to:

- provide an economical, safe, and environmentally sensitive transportation system for the Forest. Emphasize the maintenance and restoration of existing roads over the construction of new roads where appropriate (Forest Plan, page 4-8);
- provide administrative sites and facilities that effectively and safely serve the public and accommodate the workforce. Provide facilities with barrier-free access (Forest Plan, page 4-8); and

- provide an economical, safe, and environmentally sensitive transportation system for the Forest. Emphasize the maintenance and restoration of existing roads over the construction of new roads where appropriate. Provide administrative sites and facilities that effectively and safely serve the public and accommodate the workforce. Provide facilities with barrier-free access. (Forest Plan, page 4-37).

Forest Plan management direction related to other social and economic indicators is to:

- assist rural, forest-dependent communities with efforts to enhance their economic stability and social vitality (Forest Plan, page 4-65);
- work with local community leaders and individuals to provide opportunities for the development of natural resource-based enterprises (Forest Plan, page 4-65); and
- consider rural development options and opportunities in resource decisions that may assist rural communities in achieving long-term economic development stability and quality of life (Forest Plan, page 4-66).

All alternatives will be consistent with law, regulation, policy and the Forest Plan in relation to the social and economic environment as displayed in the Forest Plan consistency checklist.

Scenery

Methodology

This evaluation applies current National Forest Landscape Management methodology in conjunction with existing Forest Plan direction. It relies heavily on previous field studies of similar types of projects, as well as field observations from sensitive viewpoints, computer modeling to determine visibility of project activities, and consideration of public preferences for scenic quality. This evaluation relies on the following assumptions:

ASSUMPTION 1: Wildfires are a natural ecological process that commonly occurs on the Forest, and as such their effects to scenery are perceived as natural. Associated fire suppression activities (i.e. fire breaks) could be perceived as management activities.

ASSUMPTION 2: Project activities proposed in Modification and/or Maximum Modification Visual Quality Objective (VQO) areas would typically meet their assigned VQOs. Frequently activities in these VQO areas are not visible from any high or moderate sensitivity viewpoints, or if they are, at middle-ground or background distances.

ASSUMPTION 3: The North Fork Salmon River road (1C01) was used as a proxy for visibility from the North Fork Salmon River. State Highway 96 was used as a proxy for visibility from the Klamath River. The Scott River road (7F01) was used as a proxy for visibility from the Scott River. Differences in elevation, adjacent vegetation, topographic screening, slope position, and horizontal alignments were factors considered in determining visibility and effects from the river perspective.

ASSUMPTION 4: Because of a highly accelerated timeline to complete project analysis, winter weather conditions limiting access, and a multitude of potential viewpoints to consider for scenery effects, a computer model was used to determine visibility of project activities from sensitive viewpoints. The primary limitations of the model include no consideration for screening vegetation and elevation differences of up to five feet; therefore, the resultant analysis describes a "worst case" analysis in terms of what may be visible from viewpoints. The visibility determination has not been field verified.

ASSUMPTION 5: Sensitive viewpoints which are linear in nature, such as trails, roads, or rivers did not utilize the computer model. The visibility assessment was based on previous experience, on-the-ground knowledge, and map reviews. The visibility determination has not been field verified.

ASSUMPTION 6: Analysis was based upon professional judgment and experience of a landscape architect with 25 years of Forest scenery evaluation experience. Based on professional judgment, it is estimated that the project has an 85-90 percent probability of successfully meeting or exceeding Visual Quality Objectives as predicted. See the "Visual Resource Management" section in 2013 Forest Plan Monitoring Report for more information.

The general process for a scenery evaluation follows:

1. Determine high or moderate sensitivity viewpoints located within or adjacent to the project area from which the project may be visible.
2. Extensive/intensive office review of project descriptions and maps; assessing project activity locations (orientation, slope position, distance from viewer, etc.), logging systems, combined with on-the-ground knowledge of topography and vegetation.
3. Two team field reviews were conducted of the project area, focusing on representative examples of project activities.
4. Individual project activities were evaluated for their visibility from high or moderate sensitivity routes. Noticeable changes from project activities to existing landforms and vegetation are evaluated in terms of form, line, color, and texture contrasts. Utilizing professional expertise, the overall visual dominance and degree of noticeable contrast to the existing scenic character is then compared against the Visual Quality Objectives (VQOs) which define levels of acceptable visual change. A judgement call of "meet," "not meet," or "exceed" the assigned VQO is then made.
5. To minimize scenery effects, project design features were developed; these are displayed in table 2-1 of chapter 2 of this draft EIS. Recreation and scenery project design features were designed to minimize or mitigate the effects of all action alternatives on recreation and scenery resources.
6. Cumulative effects to scenery were evaluated within a larger context than the individual project activities themselves, considering the potentially affected viewsheds as a whole.

Analysis Indicators

Analysis indicators used to determine the effects of alternatives on scenery include:

Scenic Character

The overall visual impression or image that gives a geographical area its identity. Scenic character is a qualitative description of the combination of vegetative patterns, landforms, water characteristics, and cultural features. The existing scenic character description provides a basis for comparing changes from alternatives and desired scenic character.

Visual Quality Objectives (VQOs)

Define levels of acceptable visual change, and are identified in the Forest Plan. The VQOs for the project area are defined below (table 2):

- Retention VQO - management activities are not visually evident to the casual Forest visitor.
- Partial Retention VQO – management activities may be noticeable, but are subordinate to the characteristic landscape.
- Modification VQO - management activities appear altered and dominate yet reflect nearby natural features.
- Maximum Modification VQO - management activities appear strongly altered and dominate but appear as natural occurrences when viewed at distances greater than 5 miles.

Spatial and Temporal Context

The spatial scale for analysis of effects to scenery includes the viewsheds from the Forest Plan-identified sensitive viewing locations. The temporal scale is defined as three years for short-term effects, at which time projects are required to meet their assigned VQOs (except Maximum Modification which is immediate). These timeframes are required by Forest Plan Standards and Guidelines. Long-term effects are defined as ten years or longer.

Affected Environment

Scenic Quality of or within National Forests is valued for the aesthetic enjoyment and physiological benefits it offers. “Viewing Natural Features” and “Viewing Wildlife” are the second and third respectively, most popular recreation activities of visitors to the Klamath National Forest (USDA 2012). Scenic quality within the project areas is important to the people who live and work in the area and to Forest visitors. Both of these groups travel through the areas, enjoying views from State, County, and Forest roads, and while recreating on National Forest lands, trails, rivers, or roads. The scenery of these areas contributes an important part to the Forest’s scenic resources.

Other recreational use in the project area consists of dispersed-type recreation such as hiking, equestrian, camping, hunting, and woodcutting (see the Recreation section of this chapter and the Recreation resource report). Scenery is an important component that affects recreation use, setting, and the recreation experience.

Viewsheds of the Project Areas

Table 3-26 displays a list of all the potential viewpoints located in/or near the three project areas that project activities could be visible from. A total of 60 potentially affected viewpoints were identified for the three project areas: Beaver Fire (9 viewpoints), Happy Camp Complex Fire (34 viewpoints), and Whites Fire (17 viewpoints). The scenery assessment of project activities uses these viewpoints. The distance zone listed identifies the closest project activity from the viewpoint.

Table 3-26: Identified potential viewsheds, Sensitivity Level, and Distance Zone by project area

Potential Viewpoint(s)	Visual Sensitivity Level	Distance Zone

Potential Viewpoint(s)	Visual Sensitivity Level	Distance Zone
Happy Camp Complex		
State Highway 96 (State of Jefferson Scenic Byway)	High	Foreground
Klamath Wild and Scenic River	High	Foreground
Klamath River community	High	Foreground
Hamburg	High	Foreground
Seiad	High	Foreground
Happy Camp	High	Foreground
O'Neil Creek Campground	High	Foreground
Sarah Totten Campground	High	Foreground
Curly Jack Campground	High	Foreground
Lake Mountain Lookout*	High	Foreground
Gordon's Ferry River Access	High	Foreground
Indian Creek River Access	High	Foreground
Scott River road (7F01)	High	Foreground
Scott Wild and Scenic River	High	Foreground
Johnson Bar River Access	High	Foreground
Scott Bar	High	Foreground
Sugar Pine Trail	High	Foreground
Townsend Gulch River Access	High	Foreground
Gold Flat River Access	High	Foreground
Tompkins River Access	High	Foreground
Tom Martin Peak Trail	Moderate	Foreground
Scott Bar Lookout*	Moderate	Middleground
Box Camp Trailhead	Moderate	Middleground
Paradise Trailhead	Moderate	Middleground
Grider Creek road (46N66, 46N24X)	High	Foreground
Grider Creek Campground	High	Foreground
Grider Creek (Wild andScenic River)	High	Foreground
Pacific Crest Trail	High	Middleground
Cold Springs Trailhead	High	Foreground
Tyler Meadows Trailhead	High	Foreground
Elk Creek road (7C001)	Moderate	Foreground
Elk Creek (Wild and Scenic River)	Moderate	Foreground
Bear Lake Trailhead road (16N05, 15N06)	Moderate	Foreground
Bear Lake Trailhead	High	Foreground
Beaver Fire		
State Highway 96 (State of Jefferson Scenic Byway)	High	Foreground

Potential Viewpoint(s)	Visual Sensitivity Level	Distance Zone
Klamath Wild and Scenic River	High	Foreground
Klamath River community	High	Foreground
Gottville River Access	High	Foreground
Brown Bear River Access	High	Foreground
Beaver Creek Road (8J01/11)	High	Foreground
Beaver Creek Campground	Moderate	Foreground
Pipeline Gap/Deer Camp Road* (40S01)	Moderate	Foreground
Buckhorn Bally Lookout*	Moderate	Foreground
Whites Fire		
North Fork Road (FH102)	Moderate	Foreground
Sawyers Bar	High	Foreground
South Russian Creek (recommended Wild and Scenic River)	Moderate	Foreground
Timber Camp Trailhead	Moderate	Foreground
Timber Camp Trailhead road (36N58, 36N15)	Moderate	Foreground
Pacific Crest Trail	Moderate	Middleground
Hogan Lake Trail	Moderate	Middleground
Statue Lake Trail	Moderate	Middleground
Twin/Big Blue/Paynes Lake Trail	Moderate	Middleground
Mule Bridge Road (41N36)	Moderate	Foreground
North Fork Salmon Wild and Scenic River	Moderate	Foreground
Music Creek Trailhead	Moderate	Foreground
South Russian Creek Trailhead	Moderate	Foreground
Idlewild Campground	Moderate	Foreground
Mule Bridge Trailhead	Moderate	Foreground
Eddy Gulch Lookout*	Moderate	Middleground
Eddy Gulch Lookout road (39)	Moderate	Foreground
Whites Gulch Trail*	Moderate	Foreground
South Russian Creek Trail*	Moderate	Foreground

High = high level of interest in scenery;

Moderate = secondary County or Forest road, recreation site or area, moderate use

* = Viewpoints identified as a sensitive viewpoint post-Forest Plan and as such were not utilized in the development of Forest Plan VQOs. Post-Forest Plan viewpoints are not required to meet S and G 11-1, but should be considered during project planning.

SOURCE: USDA, Forest Service, Klamath National Forest. 2009. Scenery Sensitivity Levels Map, Klamath National Forest – Westside, which is filed at the Klamath National Forest Headquarters, Yreka, CA.

Existing Scenic Character

Scenic Character is the overall visual impression or image that gives a geographical area its identity. The overall scenic character consists of steep, rugged mountainous terrain which is bisected by major rivers and tributary creeks. These creeks are flanked by mid-elevation, steep terrain with numerous side drainages. The mountains are overlain with largely continuous, mixed conifer forest canopies. There are breaks in the forest canopy from previous wildfires, rock outcrops, meadows, roads, and older harvest activities are evident. In the background, more open higher elevation ridges and peaks provide a visual backdrop.

Vegetation is diverse in both pattern and species, with the Douglas-fir/white fir mixed conifer forest being most dominant. Conifer species include ponderosa pine, sugar pine, incense cedar, and white fir. Also, common is the Douglas-fir/tanoak community where Douglas-fir dominates the overstory with hardwoods found in the understory such as canyon live oak, black oak, white oak, pacific madrone, and big leaf maple. The hardwoods are slowly being overtopped by the conifers and declining in numbers. Some forested areas are extremely dense, where wildfires have been artificially suppressed for at least 50 years. This density of vegetation not only obstructs in-canopy views to the forest floor, but provides ladder fuels thereby increasing the risk of extreme wildfire events. Streams display extremely high water clarity. Air quality is high, with coastal moisture occasionally adding clouds and haze to the typical clear views under blue skies.

The scenic character of the project areas was substantially affected by the 2014 fire season, as described in chapter 1 of this draft EIS. The fires burned with high severity in many areas, creating standing dead trees, blackened tree boles and brush skeletons, bare soil, and dying trees with brown needles. The fire opened up views into the forest, exposing hillsides, bare soil, and rock outcrops. In many places the once green forest now looks like blackened toothpicks, while ocassionally some green trees survived the fire.

Existing Scenic Integrity

Scenic integrity is the relative degree of natural appearance displayed by a landscape. In the three project areas, current scenic integrity as viewed from inventoried sensitive viewpoints is as follows: 1) Some limited evidence of existing roads, fire breaks, plantations, and past and on-going logging units. 2) Vegetation and/or topography screen most of these management activities except when in the immediate vicinity of the activity or from distant viewpoints. Cumulatively, across the project areas as a whole, the alterations are minor, and generally a near-natural appearance dominates. Therefore the project areas have Moderate Scenic Integrity and meet a Partial Retention VQO as defined in the Forest Plan.

Desired Scenic Character

The ideal, socially valued Scenic Character of the Westside project area would display a more attractive, forested condition. These conditions would include increased vegetative and spatial variety throughout a largely continuous but more open and irregular forest canopy, with more frequent small, irregular openings and edges. There would be a widepread presence of large trees as individuals and clumps, features such as outcrops, rocks and barrens, meadows, irregular patches of native shrubs, forbs and grasses in openings and forest floor understories, scattered standing snags, scattered irregular fire-killed canopy openings containing clumps of standing dead trees over a green surface of conifer seedlings. This more open forest canopy would support attractive views through the forest canopy as well as to more distant mountainous landscapes.

Management Direction

Management direction for Scenery comes from the Forest Plan primarily under Standards and Guidelines for the Visual Resource Management Program and Retention and Partial Retention VQO Management Areas 11 and 15 respectively. However a VQO is identified in the Forest Plan for *all* National Forest lands; hence each Management Area lists the appropriate VQO in a Standard and Guideline under the "Visual Resource Management" subheading. Table 2 displays VQOs of Management Areas in which activities are proposed in this project.

For the Klamath Wild and Scenic Designated Recreational River (Management Area 13), a Retention VQO supersedes the Partial Retention VQO because Highway 96 is an eligible State Scenic Highway.

For General Forest lands (Management Area 17), a Modification or Maximum Modification VQO is utilized. The location of these VQOs was determined using criteria from the Visual Resource Management System. A majority of General Forest lands have a Modification VQO.

Table 3-27: Desired Visual Quality Objective (VQO) by Management Area (per Forest Plan)

		Visual Quality Objective (Vqo)*				
Forest Plan Management Area		Preservation	Retention	Partial Retention	Modification	Maximum Modification
Ma-5	Special Habitat			X		
Ma-7	Special Interest Area		X[1]			
Ma-10	Riparian Reserves			X		
Ma-11	Retention Visual Quality Objective		X			
Ma-12	Designated And Recommended Scenic Rivers		X			
Ma-13	Designated And Recommended Recreational Rivers		X[2]	X		
Ma-15	Partial Retention Visual Quality Objective			X		
Ma-17	General Forest				X	X

* VQO(s) are specifically identified by a Standard and Guideline for each Management Area.

[1] Per Forest Plan "Manage these areas to meet the intent of the Forest VQO map. As a minimum, manage the lands within the areas to meet a Retention VQO."

[2] Retention VQO designated elsewhere in Forest Plan for State Scenic Highways may supersede Partial Retention VQO.

A complete description of alternatives can be found in chapter 2.

Environmental Consequences

Alternative 1

Direct Effects and Indirect Effects

Alternative 1 would result in direct short- and long-term adverse effects to scenic character. In the short term, evidence of the fire with standing dead trees, blackened tree boles and brush, bare soil, and dying trees with brown needles or leaves would continue to be quite noticeable. Along many viewpoints, most screening vegetation has lost all needles or leaves, opening up views into the forest of bare soils, streams, and rock outcrops. Trees with burnt roots would start falling down. In two to three years, some brushes and grasses would return to the burn areas providing some green color, texture, and ground cover.

Decay and wind disturbance would lead to the smaller diameter, fire-killed trees falling down within the first ten years, with the majority of all trees falling down within the next 20 years (Russell et al. 2006). Standing trees would provide visual clues of the past fires for decades. As dead trees fall, the scenic character of areas once-forested would change becoming much more open. Extremely high fuel loads would develop creating a landscape that is susceptible to a high intensity, high severity fire. In many areas these conditions would likely create a long term vegetation change away from a conifer-dominated vegetation type towards a shrub-dominated ecosystem.

Without both harvest and replanting treatments within the project areas, current conditions would likely result in increased growth of brush. The competing brush, combined with a limited seed source would inhibit the natural regeneration of conifer species that dominated the landscape prior to the fires. The desired scenic character of a forested canopy with large tree character, as well as increased species diversity would be adversely affected. Without management treatments, achievement of the desired condition for scenery would be set back 50 plus years or more.

Visual Quality Objectives establish acceptable levels of alteration for management activities. For alternative 1, there would be no effects to the Visual Quality Objectives because no project activities will be implemented.

Cumulative Effects

Several other private land parcels within the project area have been or are proposed for salvage logging. Removal of all dead trees would create texture contrasts with adjacent forested lands. If trees are removed up to and along straight property boundaries, these line contrasts would likely be noticeable from some sensitive viewpoints.

Other ongoing and future foreseeable actions on the Forest include projects with vegetation treatments such as commercial thinning, pre-commercial thinning, and mastication. Most projects also include a fuels treatment component such as underburning, thinning of small diameter understory trees or brush, piling, and pile burning. All of these projects would affect scenery, creating both short- and long-term beneficial effects to scenic character. Densely forested areas would be opened up (thinned); this more open forest canopy would support attractive views through the forest canopy as well as to more distant mountainous landscapes. Fuels treatments would increase the resiliency of the areas to high intensity wildfires and help to perpetuate ecologically established scenery. These projects would create noticeable visual contrasts in the short term and likely be visible from some sensitive viewpoints. In two-three years after project completion, "greening up" these activities would appear near-natural. Adding the effects of these projects to the effects of alternative 1 on scenic character would have minor cumulative effects.

Alternatives 2, 3, 4 and 5

Because of minor differences between alternatives, the analysis description for all four alternatives has been combined into one section. The four action alternatives propose hazardous fuels treatments, salvage harvest, roadside hazard treatments, and reforestation (site preparation, planting, and release). Table 3-28 displays the acreage of treatment types within each action alternative by type of VQO.

Table 3-28: Acres of Treatment Types by Alternative by Visual Quality Objectives for the project area

Treatment Type	Retention	Partial Retention	Modification	Maximum Modification
Alternative 2				
Fuels Treatments	2,264	18,162	775	231
Salvage Harvest Units (<60% of the unit is salvage logged)	1,646	9,100	697	689
Roadside Hazard	1,695	15,941	1,610	1,118
Site Prep/Plant	197	6,335	841	484
Total	**5,801**	**49,539**	**3,923**	**2,522**
Alternative 3				
Fuels Treatments	2,264	18,162	775	231
Salvage Harvest Units (<60% of the unit is salvage logged)	1,611	8,040	529	176
Roadside Hazard	1,695	15,941	1,610	1,118
Site Prep/Plant	197	6,335	841	484
Total	**5,767**	**48,479**	**3,755**	**2,009**
Alternative 4				
Fuels Treatments	2,264	18,162	775	231
Salvage Harvest Units (<60% of the unit is salvage logged)	872	8,464	664	629
Roadside Hazard	1,663	15,199	1,472	1,116
Site Prep/Plant	197	6,335	841	484
Total	**4,996**	**48,180**	**3,752**	**2,460**
Alternative 5				
Fuels Treatments	2,269	18,599	1,230	525

Treatment Type	Retention	Partial Retention	Modification	Maximum Modification
Salvage Harvest Units (<60% of the unit is salvage logged)	236	1,957	677	659
Roadside Hazard	1,695	15,941	1,610	1,118
Site Prep/Plant	30	2,540	801	484
Total	**4,230**	**39,038**	**4,318**	**2,785**

Direct Effects and Indirect Effects

Below is a generalized description of the various project activities and associated effects to scenic character. A discussion of effects to VQOs then follows:

Visibility Analysis

A computer viewshed analysis was used to determine the visibility of project activities. The primary limitations of the model include no consideration for screening vegetation and elevation differences of up to five feet; therefore, the resultant analysis describes a "worst case" analysis in terms of what may be visible from viewpoints. The visibility determination has not been field verified. Sensitive viewpoints were analyzed to determine if any project activity would be visible, and then if so which specific treatment(s). The analysis indicated most viewpoints would have visibility of two project treatments or more; three viewpoints would not have visibility of any activities. Results are displayed in table 4 for fire-related project areas.

Table 4: Visibility of Project Treatments From Sensitive Viewpoints for Three Project Areas.

Potential Viewpoint(s)	Visual Sensitivity Level	Project Area	Fuels Treatments	Salvage Harvest	Roadside Hazard Treatments	Site Prepatation and Planting
		Is the project area or activity potentially visible from the scenic viewpoint[23]?				
Beaver Fire						
State Highway 96 (State of Jefferson Scenic Byway)	High	Y	Y	N	Y	N
Klamath Wild and Scenic River	High	Y	Y	N	Y	N
Klamath River community	High	Y	Y	N	N	N

[23] Based upon computer modeling; not field verified.

Gottville River Access	High	Y	Y	N	Y	N
Brown Bear River Access	High	N	N	N	N	N
Beaver Creek Road (8J01/11)	Moderate	Y	Y	N	Y	Y
Beaver Creek Campground	Moderate	Y	Y	N	N	Y
Pipeline Gap/Deer Camp Road* (40S01)	Moderate	Y	Y	Y	Y	Y
Buckhorn Bally Lookout*	Moderate	Y	Y	Y	Y	Y
Happy Camp Complex						
State Highway 96 (State of Jefferson Scenic Byway)	High	Y	Y	Y	N	N
Klamath Wild and Scenic River	High	Y	Y	Y	N	N
Hamburg	High	Y	Y	Y	N	N
Seiad	High	Y	Y	Y	Y	Y
Happy Camp	High	Y	Y	N	Y	Y
O'Neil Creek Campground	High	Y	Y	Y	Y	N
Sara Totten Campground	High	Y	Y	Y	N	N
Curly Jack Campground	High	Y	Y	N	N	N
Lake Mountain Lookout*	High	Y	Y	Y	Y	Y
Gordon's Ferry River Access	High	Y	Y	Y	Y	Y

Indian Creek River Access	High	Y	Y	N	Y	Y
Scott River road (7F01)	High	Y	Y	Y	N	N
Scott Wild and Scenic River	High	Y	Y	Y	N	N
Johnson Bar River Access	High	Y	Y	Y	Y	N
Scott Bar	High	Y	Y	N	N	N
Sugar Pine Trail	High	Y	Y	N	Y	N
Townsend Gulch River Access	High	Y	Y	N	Y	N
Potential Viewpoint(s)	**Visual Sensitivity Level**	**Project Area**	**Fuels Treatments**	**Salvage Harvest**	**Roadside Hazard Treatments**	**Site Preparation and Planting**
		Is the project area or activity potentially visible from the scenic viewpoint[24]?				
Gold Flat River Access	High	Y	Y	N	Y	N
Tompkins River Access	High	Y	Y	N	Y	N
Tom Martin Peak Trail	Moderate	Y	N	Y	N	N
Scott Bar Lookout*	Moderate	Y	Y	Y	Y	Y
Box Camp Trailhead	Moderate	Y	Y	N	Y	Y
Grider Creek road (46N66, 46N24X)	High	Y	Y	Y	N	N
Grider Creek Campground	High	Y	Y	Y	Y	N
Grider Creek (Wild andScenic River)	High	Y	N	Y	N	N

[24] Based upon computer modeling; not field verified.

Pacific Crest Trail	High	Y	Y	Y	N	N
Cold Springs Trailhead	High	Y	N	Y	Y	Y
Tyler Meadows Trailhead	High	Y	Y	Y	N	Y
Elk Creek road (7C001)	Moderate	Y	Y	N	N	N
Elk Creek (Wild and Scenic River)	Moderate	Y	Y	N	N	N
Bear Lake Trailhead road (16N05, 15N06)	Moderate	Y	N	N	Y	N
Bear Lake Trailhead	High	Y	N	N	Y	N
Whites Fire						
North Fork Road (FH102)	Moderate	Y	Y			
Sawyers Bar	High	Y	Y	Y	N	Y
South Russian Creek (recommended Wild and Scenic River)	Moderate	N	N	N	N	N
Timber Camp Trailhead	Moderate	Y	Y	N	Y	N
Timber Camp Trailhead road (39N58, 39N15)	Moderate	Y	Y	Y	Y	Y
Pacific Crest Trail	Moderate	Y	Y	N	N	N
Hogan Lake Trail	Moderate	N	N	N	N	N
Statue Lake Trail	Moderate	Y	N	Y	Y	Y
Twin/Big Blue/Paynes Lake Trail	Moderate	Y	N	N	N	N

Mule Bridge Road (41N37)	Moderate	Y	Y	N	Y	N
North Fork Salmon Wild and Scenic River	Moderate	Y	Y	Y	Y	N
Music Creek Trailhead	Moderate	Y	N	N	N	Y
Potential Viewpoint(s)	**Visual Sensitivity Level**	**Project Area**	**Fuels Treatments**	**Salvage Harvest**	**Roadside Hazard Treatments**	**Site Preparation andPlanting**
		Is the project area or activity potentially visible from the scenic viewpoint[25]?				
South Russian Creek Trailhead	Moderate	Y	N	N	Y	Y
Idlewild Campground	Moderate	Y	Y	N	N	N
Mule Bridge Trailhead	Moderate	Y	Y	N	N	N
Eddy Gulch Lookout*	Moderate	Y	Y	Y	Y	Y
Eddy Gulch Lookout road (39)	Moderate	Y	Y	Y	Y	Y
Whites Gulch Trail*	Moderate	Y	Y	N	N	N
South Russian Creek Trail*	Moderate	N	N	N	N	N

Salvage Harvest

The removal of dead and dying trees would create large openings with line and texture contrasts with adjacent burned or forested areas. Individual larger snags and clumps with no treatment would be retained for wildlife resources. These would provide some texture to the units when viewed from sensitive viewpoints. Logging systems can further influence the noticeable visual contrasts by the disturbances they create. Helicopter creates the least visual contrasts; skyline creates linear contrasts from log skidding and

[25] Based upon computer modeling; not field verified.

cable corridors; and ground-based creates more color contrasts from soil disturbance by equipment and log skidding.

Roadside Hazard Treatments

The removal of both merchantable and non-merchantable hazard trees along system roads and through treatment units, would “open up” travel corridors in those areas where a higher number of trees are removed. In other areas where only individual or isolated trees are removed, there would be little change or effect to overall scenic character. Ground disturbance, tree stumps, and trees felled and left would be noticeable in the short term. A recovery time of three years would allow seasonal leaf and needle cast, weathering (graying) of tree stumps and chips, and resprouting of vegetation or “greening up” to soften these effects.

Hazardous Fuels Treatments

These treatments would occur along strategic ridgelines, roads, or control lines. Trees would be removed (12 inches in diameter at breast height or less) and other understory vegetation by mechanical, machine, or hand work. Slash would be piled and burned, lop and scattered, or chipped. Remaining trees would be pruned up to seven feet. The short-term visual impacts from felling and piling dead trees and then burning would create color and texture soil contrasts. Removing understory vegetation and tree pruning would open views into the forest and of the forest floor. Fuels breaks along visible ridgelines would create longer-term linear contrasts. A recovery time of three years would allow seasonal leaf and needle cast, weathering (graying) of tree stumps and chips, and resprouting of vegetation or “greening up” to soften these effects.

Prescribed Fire

The short term visual impacts from underburning would create brown vegetation, red tree crowns, blackened duff layer, and scorched trunks. Scraping control lines to mineral soil would create linear disturbances. Recovery times of three years would allow revegetation or “greening up” of many of the burn effects. At that point, any residual effects from the underburn would appear as a natural occurrence, consistent with the many wildfires that have occurred throughout the Forest. Underburning would create long term positive effects such as the creation of more open stands where forest visitors can look into stands, larger trees and wildlife can be observed by travelers, greater species diversity, and increased resiliency of the stand to wildfire. This activity would easily meet all assigned VQOs and help meet (Standard and Guideline 11-4) to perpetuate the Forest’s ecologically established land

Site Preparation, Planting and Release (Reforestation)

Planting in areas previously stocked (pre-fire) with conifers, combined with rocky or unplantable sites, and tree survival rates, would provide spatial variability across the project areas. This would speed up recovery of burned areas to a mostly forested condition with some openings and appear natural in the long term. This would be consistent with the Desired Scenic Character to a forested condition.

Visual Quality Objectives (VQOs)

A “worst case scenario” has been utilized to make the “meet” or “not meet” Forest VQOs determination. This strategy was employed because results have not been field verified, nor have site specific project design features been developed to possibly reduce visual disturbances to acceptable levels. The “meet” or “not meet” determination by project treatment is based on previous Forest projects of a similar nature.

Table 3-29: Preliminary Results of Meeting or Not Meeting VQO by Alternative by Treatment Type.

All Alternatives and Treatment Type	Does Treatment Type Meet VQO? (Yes or No)			
	Retention	Partial Retention	Modification	Maximum Modification
Fuels Treatments	Y	Y	Y	Y
Salvage Harvest	N*[26]	Y/N*	Y	Y
Roadside Hazard	N*	Y/N*	Y	Y
Prepare Site and Plant	Y	Y	Y	Y

Minor localized short-term direct adverse effects to VQOs from management treatments would occur during project implementation with the presence of equipment, smoke, stumps, exposed soils, and cut and/or piled vegetation.

Retention VQO areas

Salvage harvest and roadside hazard treatments in Retention VQO areas would likely not meet the Retention VQO – where management activities are not visually evident to the casual Forest visitor. However an exception is allowed under Forest Plan Standards and Guideline 11-7 which states “In the case of recovery activities after extreme catastrophic events such as intense wildland fires, time periods to achieve the VQOs stated in Forest-wide and Management Area Standards and Guidelines may be extended. This would be necessary where previously unnoticed scenery alterations are exposed to view due to loss of vegetative screening, or during timber salvage activities where recovery of forest vegetation is determined to be of greater importance than achievement of VQOs within the time periods established.”

The presence of high stumps and tree marking paint (if used) would be noticeable for five to 10 years even after “greening up.” This includes salvage units located in the foreground distance zone of Highway 96, Klamath Wild and Scenic River, Tyler Meadows Trailhead, Cold Springs Trailhead, Grider Creek (recommended Wild and Scenic River), Grider Creek Campground, Grider Creek road (46N66, 46N24X), and the Pacific Crest Trail (between Cold Springs Trailhead and Highway 96).

Partial Retention VQO areas

Salvage harvest and roadside hazard treatments in the foreground distance zone along hiking trails would likely not meet the Partial Retention VQO in three years – where management activities may be noticeable, but are subordinate to the characteristic landscape. The presence of high stumps and tree marking paint (if used) would be

[26] *= Not meeting a VQO in the three year timeframe is inconsistent with Forest Plan Standards and Guidelines numbers MA12-7 and MA13-6. However, an exception is allowed under Forest Plan Standards and Guidelines number 11-7 which states ”In the case of recovery activities after extreme catastrophic events such as intense wildland fires, time periods to achieve the VQOs stated in Forest-wide and Management Area Standards and Guidelines may be extended. This would be necessary where previously unnoticed scenery alterations are exposed to view due to loss of vegetative screening, or during timber salvage activities where recovery of forest vegetation is determined to be of greater importance than achievement of VQOs within the time periods established.”

noticeable to hikers for 10 years or more. This includes units bisected by both the Tom Martin Peak and Bear Lake trails.

Although this appears inconsistent with Forest Plan Standards and Guidelines numbers MA15-1, MA15-5, and MA15-10, an exception is allowed under Forest Plan Standards and Guideline 11-7 which states ”In the case of recovery activities after extreme catastrophic events such as intense wildland fires, time periods to achieve the VQOs stated in Forest-wide and Management Area Standards and Guidelines may be extended. This would be necessary where previously unnoticed scenery alterations are exposed to view due to loss of vegetative screening, or during timber salvage activities where recovery of forest vegetation is determined to be of greater importance than achievement of VQOs within the time periods established.”

All other project activities (including salvage units not located in foreground distance zones along hiking trails) would likely meet their assigned VQO of Partial Retention in three years. A recovery time of three years would allow seasonal leaf and needle cast, weathering (graying) of tree stumps and chips, and resprouting of vegetation or “greening up” to soften these effects. Thus project activities would appear near-natural to Forest visitors.

Thus in the long-term these project activities (salvage harvest and roadside hazard treatments in the foreground distance zone along hiking trails) and all other project activities would appear near-natural to Forest visitors and meet a Partial Retention VQO. Forest Plan direction would be met.

Modification and Maximum Modification VQO areas

All activities would meet their assigned VQOs within Forest Plan timelines. These activities are located either in middleground or background distance zones from sensitive viewpoints or not visible.

However cumulative scenic quality effects are evaluated in a larger context than the individual project activities themselves - the potentially affected viewsheds as a whole. The scenery analysis area includes the multitude of viewsheds throughout the project areas. When viewed from multiple viewpoints, proposed management activities in all viewsheds would be appear visually subordinate to the characteristic landscape. All viewsheds would be natural or near-natural appearing and meet or exceed a Partial RetentionVQO.

Cumulative Effects

Cumulative effects of action alternatives are the same as for alternative 1.

Comparison of Effects

Scenery effects are displayed by alternative in table 6.

Table 3-30: Scenery Comparison of Effects of Alternatives

Indicator	Alternative 1 (No Action)	Alternatives 2, 3, 4, and 5

Indicator	Alternative 1 (No Action)	Alternatives 2, 3, 4, and 5
Visual Quality Objectives (VQOs)	No effect to VQOs	Minor localized short-term direct adverse effects to VQOs from management treatments during project implementation with the presence of equipment, smoke, stumps, exposed soils, and cut and/or piled vegetation. “Greening up” for three years after project completion would reduce visual evidence of fuels, roadside hazard, and site prep/plant activities to acceptable levels. Although VQOs would not be met for salvage harvest and roadside hazard treatments in Retention or Partial Retention (foreground zone along hiking trails) VQO areas, Forest Plan consistency will be met (Forest Plan SandG 11-7)
Scenic Character	Long term adverse effect with permanent vegetation change away from a conifer-dominated vegetation type towards a shrub-dominated ecosystem. Achievement of the desired condition would be set back 50 plus years or more.	Indirect long-term beneficial effect to scenic character from management treatments would be speeding up recovery of the burn areas to a conifer-dominated character that is more consistent with historic scenery conditions and Desired Scenic Character.

Compliance with law, regulation, policy, and the Forest Plan

This project would help achieve the Forest Plan desired conditions to perpetuate ecologically established scenery. Reforestation would speed up recovery to a forested condition and fuels reduction treatments would reduce the likelihood of high intensity wildfires. The project would meet Forest Plan Visual Quality Objectives (VQOs) in the long term.

In the short term, noticeable visual disturbances from salvage harvest and roadside hazard treatments in Retention VQO areas and some Partial Retention VQO areas would likely not meet their assigned Visual Quality Objectives (VQOs). Although this appears inconsistent with some Forest Plan Standards and Guidelines, an exception is allowed under Forest Plan Standards and Guideline 11-7 which states ”In the case of recovery activities after extreme catastrophic events such as intense wildland fires, time periods to achieve the VQOs stated in Forest-wide and Management Area Standards and Guidelines may be extended. This would be necessary where previously unnoticed scenery alterations are exposed to view due to loss of vegetative screening, or during timber salvage activities where recovery of forest vegetation is determined to be of greater importance than achievement of VQOs within the time periods established.” These disturbances would “green up” over time (10 years) and meet the Retention or Partial Retention VQO. Integration of scenery project design features insures this project is consistent with Forest Plan scenery desired conditions and direction.

Recreation

The purpose of the section is to identify recreation use and opportunities in the project area and examine the effects of the project alternatives on these uses and opportunities.

Methodology

A recreation assessment of project activities was conducted using field and office review, professional expertise, and on-the-ground knowledge.

Analysis Indicators

Analysis indicators used to determine the effects of alternatives on recreation include:

1. Recreation use - Will overall use increase or decrease as a result of the action?
2. Recreation Opportunities - How will the project affect existing and or new recreational opportunities?

Spatial and Temporal Context

The geographic extent for analysis of the effects for recreation include the three individual project areas - Beaver Fire, Happy Camp Complex, and the Whites Fire included as part of the Westside Fire Recovery Project. This unit of spatial analysis is used for determining direct, indirect, and cumulative effects. A short-term timeframe of three years allows the activities associated with this project to be mostly completed. A long-term temporal bound of 10 years allows completed activities associated with this project to be established.

Affected Environment

Recreational use in the project areas is low and consists primarily of dispersed recreation opportunities. "Dispersed recreation is outdoor recreation that involves relatively low density use and occurs over broad expanses of land and water. Eighty percent of the Forest's recreational use is dispersed recreation. Most dispersed activity occurs during the summer and fall months. All dispersed areas are currently managed at low standard levels" (Forest Plan, page 3-11). Dispersed recreation opportunities include primitive camping, fishing, hunting, equestrian use, hiking, swimming/water play, whitewater rafting/kayaking, woodcutting, and viewing scenery.

Camping occurs at both developed campgrounds and primative dispersed campsites within the Wildernesses or along roads throughout the project areas. See Table 1 below for a listing of these features.

Hunting is the most popular primary activity for Forest visitors (USDA Forest Service 2012), with large numbers of people visiting the Forest primarily to hunt deer or other big game (elk, bear). During hunting seasons, developed campground occupancy increases, many primative campsites are occupied, and All-terrain Vehicles (ATVs) use Forest roads in the project areas.

Hiking occurs on numerous Wilderness trails, the Pacific Crest Trail (PCT) and other trails. The 2014 fires burned two bridges (Grider 3 and 4) and some trail signs. Trail treads were also damaged from burned tree roots, soil erosion from increased runoff, and increased sedimentation of water diversion features. For detailed information see the Burned Area Emergency Response reports for Happy Camp Complex, Whites Fire, and Beaver Fire, dated 10/1/2014, 9/12/2014, and 9/12/2014, respectively (reports are available at: http://www.fs.usda.gov/main/klamath/home).

Fishing occurs on rivers and high elevation lakes. Drift boats float the Klamath River for steelhead and salmon. Trout fishing occurs at high elevation lakes in the Wildernesses.

Whitewater rafting/kayaking and swimming water play occur primarily on the Klamath and Scott Rivers and to a lesser degree on the North Fork Salmon River. Use occurs from outfitter-guided trips as well as private parties. Some of these users camp at nearby river accesses, dispersed sites along the river or developed campgrounds.

Woodcutting is a popular recreation activity on the Forest; Douglas-fir, incense cedar, white oak, black oak, and madrone are preferred woodcutting species.

Scenery is an important component that affects recreation use, setting, and the recreation experience. Viewing scenery from within or outside project area boundaries occurs while driving along roadways such as the State of Jefferson Scenic Byway, floating or fishing rivers such as the Klamath or Scott Wild and Scenic Rivers, hiking on the Pacific Crest Trail other Wilderness trails, or overlooking the area from viewpoints such as fire lookouts.

For the Beaver Fire, there are six recreation features within the project area (one developed campground and five features related to dispersed recreation). For the Happy Camp Complex Fire, there are 23 recreation features within the project area (five developed campgrounds and 18 features related to dispersed recreation). For the Whites Fire, there are 10 recreation features within the project area (one developed campground and nine features related to dispersed recreation). See table 3-31 for more information.

Table 3-31: Summary of Recreation Features located within Beaver Fire, Happy Camp Complex Fire, and Whites Fire Project Areas

Recreational Feature	Feature Description
Beaver Fire	
Klamath River	Designated National Wild and Scenic River
Gottville River Access	Klamath River access
Highway 96 State of Jefferson Scenic Byway	National Forest Scenic Byway
Pacific Crest Trail (PCT)	National Scenic Trail
Beaver Creek Campground	Developed Campground
Dispersed Campsites (5)[27]	51D010 (Deer Meadows) adjacent, 51D002, 51D003 (Beaver/Hungry Ck), 51D029, 51D029A (Brown Bear) shown on Motor Vehicle Use Map
Happy Camp Complex Fire	
Klamath River	Designated National Wild and Scenic River
Indian Creek River Access	Klamath River access
Scott River	Designated National Wild and Scenic River
Johnsons Bar River Access	Scott River access
Townsend Gulch River Access	Scott River access
Gold Flat River Access	Scott River access
Sugar Pine River Access	Scott River access
Tompkins Creek River Access	Scott River access
Bridge Flat Campground	Scott River access

[27] Total number of dispersed campsites shown is taken from 2012 Motor Vehicle Use map and does not include campsites in Wilderness or immediately adjacent to forest roads.

Recreational Feature	Feature Description
Elk Creek	Recommended National Wild and Scenic River
Grider Creek	Recommended National Wild and Scenic River
Pacific Crest Trail (PCT)	National Scenic Trail
Cold Springs Trailhead	PCT access/Marble Mountain Wilderness access
Tyler Meadows Trailhead	PCT access/Marble Mountain Wilderness access
Kelsey Creek Trail	National Recreation Trail
Bear Lake Trailhead	Kelsey Creek Trail access
Highway 96 State of Jefferson Scenic Byway	National Forest Scenic Byway
Sarah Totten Campground	Developed Campground
ONeil Creek Campground	Developed Campground (closed for 6 years)
Grider Creek Campground	Developed Campground (currently closed by Forest Order until 05/15/15)
Curly Jack Campground	Developed Campground
Dispersed Campsites (28)[28]	As shown on Motor Vehicle Use Map
Lake Mountain Lookout	Fire Lookout
Whites Fire	
North Fork Salmon River	Designated National Wild and Scenic River
South Russian Creek	Recommended National Wild and Scenic River
Pacific Crest Trail	National Scenic Trail
Mule Bridge Trailhead	Dispersed Campsites, Marble Mountain Wilderness access
Timber Camp Trailhead	Russian Wilderness access
South Russian Trailhead	Russian Wilderness access
Music Creek Trailhead	Russian Wilderness access
Idlewild Campground	Developed Campground (currently closed by Forest Order until 05/15/15)
Robinson Flat	Dispersed campsites
Dispersed Campsites (3)[29]	54D001, 54D011, 54D012 shown on Motor Vehicle Use Map

A complete description of the Westside Fire Recovery project can be found in chapter 2.

Environmental Consequences

Alternative 1

Direct Effects and Indirect Effects

Recreation Use

Under this alternative no project treatment activities are proposed. Without treatment there would be about 640 miles of untreated roadways with fire-killed tree hazards.

[29] Total number of dispersed campsites shown is taken from 2012 Motor Vehicle Use map and does not include campsites in Wilderness or immediately adjacent to forest roads.

Fallen snags along 640 miles of roadways would substantially impact access for recreational uses such as dispersed camping, scenic driving, and hunting. As fire-killed trees continue to decay and fall, public and worker safety would be threatened and the likelihood of potential injuries or death to individuals would increase. Forest Orders to restrict public access might be needed to mitigate risks to the recreating public.

With the exception of temporary closures by Forest Order, there is no reason to expect recreation use to measurably increase or decrease as a result of this alternative. Temporary closures of campgrounds, roads, rivers, or trails or portions of the burn area would displace users to other available areas within or outside of the burn affected area.

Fire-killed trees from the recent fires would greatly increase firewood availability for permitted collection; the permitted public would be most likely to collect fallen fire-killed trees and/or newly created (fire-killed) snags adjacent to roads. Firewood cutting use would likely increase in burned areas in the short term. Since re-sprouting of hardwood trees and brush in burned areas would attract deer by providing browse, if Forest Orders do not affect public access, deer hunting use in burned areas would likely increase in the short term. Recreation use is also associated with scenic vistas; see the scenery section of this chapter and the Scenery resource report for detailed information.

Recreation Opportunities

The likelihood of damage to infrastructure such as campgrounds and trails would progressively increase. As fire-killed snags continue to fall, it is anticipated that maintenance work and associated costs would increase, as well as the safety hazard to Forest visitors, workers, and volunteers who use or maintain Forest trails and other recreation infrastructure.

If and where access to the recreating public is not restricted, then fire-killed snags and resultant loss of shade would create hot and dry dispersed campsites and trail sections for hikers, adversely affecting their recreational experience. Assuming no Forest Orders are issued closing public access, camping at both developed campgrounds and primitive dispersed campsites would be expected to continue at their current rates.

Cumulative Effects

Based on current and reasonably foreseeable future actions (listed in appendix C), there are no cumulative effects to recreation because these do not overlap in time or space with recreation use and opportunities.

Alternatives 2, 3, 4, and 5

Direct Effects and Indirect Effects

Recreation Use

The operational impacts from project activities such as traffic, noise, dust, and smoke are short-term adverse impacts to recreationists; effects would be temporary in nature. Safety hazards from fire-killed snags along Forest roadways used for access by the recreating public would be abated. Forest Orders to restrict public access because of road conditions would not likely be required, providing for continued public access for recreational opportunities. Recreational use is not expected to measurably increase or decrease as a result of this alternative.

Project implementation may result in short-term changes in recreational use patterns but will not impact recreational opportunities.

Recreation Opportunities

Indirect long term beneficial effects to recreation facilities such as river accesses, campgrounds, dispersed campsites, and trailheads would occur from adjacent fuels treatments and roadside hazard removal. These activities would minimize damage or protect Forest Service infrastructure (i.e. signage, toilets, tables, etc.) at developed sites from future wildfires. Removal of hazard trees adjacent to dispersed campsites would increase safety at these sites. Table 3-32 provides a list of recreation facilities that benefit from roadside hazard and fuels treatments.

Table 3-32: List of Recreation Facilities benefiting from Roadside Hazard and Fuels Treatments

Project Area	Recreational Feature
Beaver Fire	Beaver Creek Campground Gottville River Access
Happy Camp Complex Fire	Johnson Bar River Townsend Gulch River Access Gold Flat River Access Sugar Pine River Access Thompkins Creek River Access Bridge Flat Campground Cold Springs Trailhead Bear Lake Trailhead Sarah Totten Campground ONeil Creek Campground Grider Creek Campground
Whites Fire	Mule Bridge Campground/Trailhead Idlewild Campground Robinson Flat

An indirect beneficial effect to recreation from prescribed burned, site preparation and replanting would be both a short- and long-term improvement in big game habitat and future big game hunting opportunities.

A project design feature blocking access to temporary roads upon project completion would mitigate unauthorized public travel off system roads.

An indirect beneficial effect to recreation would be that non-merchantable (<16”dbh) trees felled during roadside hazard treatments would be left along non-strategic roads for wood-cutters. This readily available wood would cause a short-term increase in permitted fuelwood collection.

When Forest visitors recreate on National Forest System lands, they use a variety of recreation settings. The settings or Recreation Opportunity Spectrum (ROS) Classes are identified in the Forest Plan for each Management Area and are listed in table 3-33.

Table 3-33: Applicable Desired Recreation Opportunity Spectrum Classes by Management Area

Forest Plan Management Area		Desired ROS Class*					
#	Management Area	Primitive	Semi-Primitive Non-Motorized	Semi-Primitive Motorized	Roaded Natural	Rural	Urban

Forest Plan Management Area		Desired ROS Class*					
Ma-5	Special Habitat		**X**	**X**	**X**		
Ma-7	Special Interest Area		**X**	**X**	**X**		
Ma-10	Riparian Reserves		**X**	**X**	**X**		
Ma-11	Retention Visual Quality Objective		**X**	**X**	**X**		
Ma-12	Designated And Recommended Scenic Rivers		**X**	**X**	**X**		
Ma-13	Designated And Recommended Recreational Rivers		**X**	**X**	**X**		
Ma-15	Partial Retention Visual Quality Objective		**X**	**X**	**X**		
Ma-17	General Forest				**X**	**X**	

*** A range of ROS Classes is specifically identified by a Standard and Guideline for each Management Area.**

While visitors are recreating in these settings, they would see some evidence (visual disturbances) of management activities within various recreation settings. The effects to the naturalness of these settings are measured using Visual Quality Objectives (VQOs) which are compatible with ROS Classes. Table 3-34 displays compatibility between ROS Classes and VQOs.

Table 3-34: Compatibility of Visual Quality Objectives (VQOs) and Recreation Opportunity Spectrum (ROS) Classes

	Visual Quality Objectives				
ROS Class	**Preservation**	**Retention**	**Partial Retention**	**Modification**	**Maximum Modification**
Primative (P)	Norm	Inconsistent	Unacceptable	Unacceptable	Unacceptable
Semi-Primative Non-Motorized (SPNM)	Fully Compatible	Norm	Inconsistent	Unacceptable	Unacceptable
Semi-Primative Motorized (SPM)	Fully Compatible	Fully Compatible	Norm (1)	Inconsistent	Unacceptable
Roaded Natural (RN)	Fully Compatible	Norm	Norm	Norm	Inconsistent
Rural (R)	Fully Compatible	Fully Compatible	Norm	Norm	Inconsistent
Urban (U)	Fully Compatible	Fully Compatible	Fully Compatible	Fully Compatible	Not Applicable

1 = Norm From Sensitive Roads And Trails.

Source: Usda, Forest Service. 2000. Landscape Aesthetics A Handbook For Scenery Management. Agriculture Handbook Number 701. Page F-3.

Some recreation settings would be adversely affected in the short-term from project activities not meeting the compatible VQO. Salvage harvest and roadside hazard treatments may affect the quality of the recreation experience while driving, floating, hiking, or camping at the following locations: Highway 96, Klamath Wild and Scenic

River, Tyler Meadows Trailhead, Cold Springs Trailhead, Grider Creek (recommended Wild and Scenic River), Grider Creek Campground, Grider Creek Road (46N66, 46N24X), Tom Martin Peak trail, Bear Creek Trail, and the Pacific Crest Trail (between Cold Springs Trailhead and Highway 96).

Within Retention VQO areas, salvage harvest and roadside hazard treatments would likely not meet the Retention VQO in the short term – where management activities are not visually evident to the casual Forest visitor. The presence of high stumps and tree marking paint (if used) would be noticeable for five to 10 years even after "greening up." This includes salvage and roadside hazard treatment units located in the foreground distance zone of Highway 96, Klamath Wild and Scenic River, Tyler Meadows Trailhead, Cold Springs Trailhead, Grider Creek (recommended Wild and Scenic River), Grider Creek Campground, Grider Creek road (46N66, 46N24X), and the Pacific Crest Trail (between Cold Springs Trailhead and Highway 96). A recovery time of up to ten years for "greening up" and plant growth may be required to soften these effects.

Although the action alternatives appear to be inconsistent with the assigned Retention Visual Quality Objective (VQO) and certain Forest Plan Standards and Guidelines for Retention, an exception is allowed under Forest Plan Standards and Guideline11-7 which states

> *"In the case of recovery activities after extreme catastrophic events such as intense wildland fires, time periods to achieve the VQOs stated in Forest-wide and Management Area Standards and Guidelines may be extended. This would be necessary where previously unnoticed scenery alterations are exposed to view due to loss of vegetative screening, or during timber salvage activities where recovery of forest vegetation is determined to be of greater importance than achievement of VQOs within the time periods established."*

Within Partial Retention VQO areas, salvage harvest and roadside hazard treatments in the foreground distance zone along hiking trails would likely not meet the Partial Retention VQO in the short term– where management activities may be noticeable, but are subordinate to the characteristic landscape. The presence of high stumps and tree marking paint (if used) would be noticeable to hikers for 10 years or more until screening vegetation hides effects. This includes units bisected by both the Tom Martin Peak and Bear Lake trails. However, the same exception under Standard and Guideline11-7 (cited above) also applies to partial retention areas for this project.

Thus in the long-term project activities would appear natural or near-natural to Forest visitors and meet Visual Quality Objectives (VQOs) which are compatible with ROS Classes. Forest Plan direction would be met. The Scenery and the Wild and Scenic Rivers sections of this chapter and related resource reports provide more information on the relationship between recreation and those resources.

Cumulative Effects

The cumulative effects of action alternatives are the same as those of alternative 1.

Comparison of Effects

Recreation effects are displayed by alternative in table 3-35.

Table 3-35: Recreation Comparison of Effects of Alternatives for all three fire areas

Indicator	Alternative 1 (No Action)	Alternatives 2, 3, 4, and 5
Recreation Use	Potential short-term impact or displacement of recreational use if a Forest Order is needed to mitigate for public safety. There would be no short-term adverse effects associated with project implementation. Increased short-term use of burn areas for firewood cutting and deer hunting.	Recreational use is not expected to measurably increase or decrease as a result of this alternative. Direct short-term adverse effect from smoke, road closures, or increased traffic during project implementation. Indirect short-term increase in use from firewood cutting of felled (non-merchantable) trees left along non- strategic roads from roadside hazard treatments.
Recreation Opportunities	Direct long-term adverse effect to dispersed camping and hiking opportunities in burn areas from loss of shade. Increased short-term and long-term safety concerns from fallen snags. Increased maintenance costs for Forest infrastructure. No adverse effects to recreation settings from project implementation.	Indirect short and long-term beneficial effect to big game hunting opportunities from prescribed fire and replanting. Indirect long-term beneficial effect to developed recreation facilities and dispersed campsites from fuels and roadside hazard treatments. These treatments would protect Forest Service infrastructure and/or increase safety at these sites. Indirect long-term adverse effects to recreation settings from project activities in some locations.

Compliance with law, regulation, policy, and the Forest Plan

This project will help achieve Forest Plan direction to maintain existing Recreation Opportunity Spectrum Classes. See the Forest Plan consistency checklist for details about applicable standards and guidelines.

Wild and Scenic Rivers

A Wild and Scenic Rivers evaluation was conducted for three designated and three recommended rivers as part of the Westside Fire Recovery Project. The evaluation used Wild and Scenic Rivers Act (P.L. 90-542, as amended) protection requirements in conjunction with existing Forest Plan direction.

Project activities were evaluated using field review, GIS analysis, and professional judgment for their potential effects to: 1) free flowing conditions; 2) water quality; 3) identified outstandingly remarkable value(s); and 4) Visual Quality Objectives (VQOs).

Analysis determined that all action alternatives would protect these values and would be fully compliant with all WSR Act protection requirements and Forest Plan Standards and Guidelines. Select information on resource effects for outstandingly remarkable values is reiterated in this report as taken from the Aquatic Resources, Hydrology, Wildlife, and Scenery reports. For complete details see those reports.

Methodology

Project activities were evaluated for all three project areas using field review, GIS analysis, and professional judgment for their potential effects to: 1) free flowing conditions; 2) water quality; 3) identified outstandingly remarkable value(s); and 4) Visual Quality Objectives. Select information on resource effects for water quality, fisheries, geology, wildlife, scenery, and vegetation is reiterated in this report as taken from the Aquatic Resources, Hydrology, Wildlife, and Scenery reports. For complete details see those reports.

Analysis Indicators

Analysis indicators are identified for each of the values listed below to be protected or maintained:

3. **Free Flowing Conditions:** As applied to any river or section of a river, means existing or flowing in natural condition without impoundment, diversion, straightening, rip-rapping, or other modification of the waterway.
   Indicator: Potential resource effects were evaluated to determine if project activities would be located within the bed and banks of the river and create an obstruction or modification of the free-flowing river characteristics.
4. **Water Quality:** Water quantity and quality must be sufficient to protect river values.
   Indicators: Resource effects to beneficial uses, stream temperature and shading, and Cumulative Watershed Effects.
5. **Outstandingly Remarkable Value(s):** Each river shall be managed to protect and enhance the values for which the river was designated, while providing for public recreation and resource uses which do not adversely impact or degrade those values.
   Indicators:

Fisheries: sediment, stream temperatures, and large wood;
Vegetation: treatments in either old growth or Engleman Spruce stands;
Wildlife: Bald Eagle –level of disturbance to nest/roost sites and risk to future potential nest areas; Siskiyou Mountain Salamander – risk of disturbance;
Geology: presence of treatments on Malone landslide;
Water Quality: risk to sediment and temperature regime alteration.

6. **Visual Quality Objectives (VQOs):**
   Scenic Rivers - From the Forest Plan, Standard and Guideline # MA12-7: Design management activities to meet the Retention VQO within the WSR Corridor. Meet the Partial Retention VQO in the foreground and the middleground beyond the Corridor.
   Recreational Rivers - From the Forest Plan, Standard and Guideline # MA13-6: Design management activities to meet a Partial Retention VQO within the WSR corridor, in the foreground beyond the Corridor and in the middleground beyond the corridor.
   Indicators: Potential effects were evaluated to determine if project activities would meet either a Retention or Partial Retention VQO as seen from the river corridor.

Spatial and Temporal Context

The spatial analysis boundary for free flowing, water quality and outstandingly remarkable value is the river area or designated corridor. This corridor is approximately ¼ mile on each side of the river. For Retention and Partial Retention VQOs the analysis boundary is the river viewshed out to four miles. Temporal bounding is three years for short term effects, at which time projects are required to meet the assigned VQOs of Retention or Partial Retention. This timeframe is required by Forest Plan Standards and Guidelines. Long term effects would be ten years or longer.

Affected Environment

In 1968 the Wild and Scenic Rivers Act was established to protect American rivers, including free-flowing conditions, water quality and their many values "for the benefit and enjoyment of present and future generations". As of 2012, 203 rivers encompassing 12,598 miles had been included in the National Wild and Scenic River (WSR) System. Rivers or sections of rivers must be free-flowing and possess at least one "outstandingly remarkable" value, such as fish, wildlife, recreation, scenery, geology, history, cultural features, or other values including ecology. WSRs displaying varying degrees of existing human alteration are assigned corresponding classification levels of Recreational, Scenic or Wild. There are six designated or recommended WSRs in the three project areas which are potentially affected by the Westside Fire Recovery Project. These are identified and described below:

Designation

The Klamath, Scott, and North Fork Salmon Rivers, which were designated by the Secretary of Interior in 1981 for their outstandingly remarkable anadromous fisheries values, are components of the National Wild and Scenic River (WSR) System.

Elk, Grider, and South Russian Creeks are recommended for inclusion in the National Wild and Scenic Rivers system in the 1995 Forest Plan. This preliminary administrative recommendation to the Secretary of Agriculture is retained until such time as Congress takes action. These recommended rivers are managed under the same guidance as designated rivers.

Outstandingly Remarkable Values (ORVs)

These may include: fish, wildlife, recreation, scenery, geology, history, cultural features, or other values including ecology. Values for potentially affected WSRs are listed in Table 1 below.

Classification

WSRs displaying varying degrees of existing human alteration are assigned corresponding classification levels of Recreational, Scenic or Wild. The Klamath, Scott, and North Fork Salmon Rivers have segments designated with a "recreational" classification. Rivers classified as "Recreational" WSR segments display the most level of development, and may include roads, bridges, buildings, and agricultural or forest clearings.

The Scott River and Grider Creek have segments identified with a "Scenic" classification. The Scenic classification applies to those rivers or sections of rivers that are free of impoundments, with shorelines or watersheds still largely primitive and shorelines largely undeveloped, but may be accessible in places by roads. River classifications are listed in Table 3-36 below.

Table 3-36: Summary of Potentially Affected Wild and Scenic Rivers by Segment Number, Classification, and Outstandingly Remarkable Value(s)

River	Segment Number	Segment Description	Classification	Outstandingly Remarkable Value	Description Of Outstandingly Remarkable Value

River	Segment Number	Segment Description	Classification	Outstandingly Remarkable Value	Description Of Outstandingly Remarkable Value
Klamath River	Kl01	Forest Boundary Near Ash Creek Confluence To Forest Boundary With Six Rivers National Forest	Recreational	Anadromous Fisheries	Anadromous Fisheries
Scott River	Sc01	Shackleford Creek To Mccarthy Creek	Recreational	Anadromous Fisheries	Anadromous Fisheries
Scott River	Sc02	Mccarthy Creek To Scott Bar	Scenic	Anadromous Fisheries	Anadromous Fisheries
Scott River	Sc03	Scott Bar To Klamath River	Recreational	Anadromous Fisheries	Anadromous Fisheries
North Fork Salmon River	Nf03	Mule Bridge Campground To Forks Of Salmon	Recreational	Anadromous Fisheries	Anadromous Fisheries
Elk Creek	El03	Bridge In Sec 19 To Bridge In Sec 25	Recreational	Fisheries	Fish And Game Rearing Pond For Chinook, Large Bedrock Holding Ponds Present.
Elk Creek	El03			Geologic	The Malone Landslide Offers The Opportunity To Observe The Effects Of A Large Slump/Debris Slide On A Major Stream.
Elk Creek	El04	Bridge In Sec 25 To Klamath River	Recreational	Fisheries	Very Good Spawning Habitat For Salmonids.
Elk Creek	El04			Wildlife	Siskiyou Mountain Salamander Has Been Located Along This Segment.
Grider Creek	Gr03	Rancheria Creek To Forest Road 46n24x	Scenic	Fisheries	High Water Quality Supporting Coho, Chinook, And Steelhead.
Grider Creek	Gr03			Vegetation	Undisturbed "Old Growth" Mixed Conifer Forest Type.
Grider Creek	Gr03			Wildlife	Bald Eagle (T And E) And Peregrine Falcon Known To Frequent This Segment.
South Russian Creek	Ru02	Wilderness Boundary To Forest Road 40n54	Recreational	Vegetation	Magnificent Stand Of "Old Growth" Engleman Spruce Along This Segment.
South Russian Creek	Ru02			Water Quality	Watershed Is Largely Pristine.

Source: 1995 Forest Plan

Boundaries

Boundaries for Designated Wild and Scenic River corridors were established in the Forest Plan, with legal descriptions listed in Appendix J of the Forest Plan EIS. The corridor boundaries vary in width to include key river features, generally averaging about ½ mile wide (including both sides of the river) for the length of the river.

Boundaries for Recommended Wild and Scenic River corridors were identified in the Forest Plan. The corridor boundaries are a uniform ½ mile width - 1/4 mile wide on each side of the river for the length of the river.

Management

WSRs are managed under the Forest Plan as Management Areas 12 Designated and Recommended Recreational Rivers and 13 Designated and Recommended Scenic Rivers with appropriate Standards and Guidelines listed for management of the river areas.

Environmental Consequences

Alternative 1

Under alternative 1, no salvage harvest, fuels treatments, or vegetation management would occur. Existing management direction would continue to guide management of the project area. A detailed description of the alternatives can be found in chapter 2 of the Westside Fire Recovery EIS.

Direct Effects and Indirect Effects

Because there would be no management actions under alternative 1, free flowing conditions and identified Outstandingly Remarkable Value(s) listed in Table 1 above would be maintained in this alternative.

The risk posed to water quality (sediment) from 950 identified legacy sediment sites is moderate to high over a ten-year period. Should a significant storm such as a 10-year event occur, there is a high risk of failure. Impacts would be similar to the channel scour, loss of stream shade, increased stream temperatures, and sedimentation that occurred in the 1997 flood as described by De La Fuente and Elder (1998). These impacts would adversely affect beneficial uses.

The risk to water quality and beneficial uses from increased stream temperature related to burnt Riparian Reserve areas is low. Additionally Elk Creek has a high risk for landsliding and perhaps a moderate risk for resulting debris flows that remove vegetation and thus negatively affect stream shade and temperature.

VQOs define acceptable levels of visual disturbance or contrast from management activities. Because there would be no management actions under the alternative 1, there would be no effect to scenery.

Cumulative Effects

In considering current and reasonably foreseeable future projects, both the Johnny O'Neil and Thom-Seider projects propose activities in the Klamath WSR corridor. Their analyses determined no effect to WSR values. The additive effect from this project's lack of action in this alternative is not anticipated to have any cumulative effects to the WSR Act's "protect and enhance" standards.

Alternatives 2, 3, 4, and 5

Because of minute differences between alternatives, the analysis for all four alternatives has been combined into one section. The four action alternatives would authorize salvage harvest, fuels treatments, roadside hazard treatments, and site prep/planting within the river corridors for Elk, Grider, and South Russian Creeks, and the Klamath, Scott, and North Fork Salmon Rivers (see table 3-37. For a detailed description of the alternatives, see chapter 2.

Table 3-37: Acres of Proposed Treatments for Alternatives 2, 3, 4, and 5 located within Wild and Scenic River corridors by River Classification and Segment

River/Segment Number (Classification)	Treatment Type	Alt 2 Acres	Alt 3 Acres	Alt 4 Acres	Alt 5 Acres
Klamath River/ Kl01 (Recreational)	Fuels Treatments	371	371	371	371
	Harvest	425	409	425	422
	Roadside Hazard	379	379	379	379
Scott River/ Sc01 (Recreational)	Fuels Treatments	252	252	252	252
	Harvest	17	17	17	17
	Roadside Hazard	364	364	364	364
Scott River/ Sc02 (Scenic)	Fuels Treatments	62	62	62	62
	Harvest	0	0	0	0
	Roadside Hazard	127	127	109	127
Scott River/ Sc03 (Recreational)					
North Fork Salmon River/Nf03 (Recreational)	Fuels Treatments	1149	1149	1149	1149
	Harvest	83	83	83	64
	Roadside Hazard	250	250	250	250
	Vegetation Management	8	8	8	8
Elk Creek/El03 (Recreational)	Fuels Treatments	516	516	516	516
	Roadside Hazard	438	438	438	438
	Vegetation Management	4	4	4	4
Elk Creek/El04 (Recreational)	Fuels Treatments	206	206	206	206
	Roadside Hazard	161	161	161	161
	Vegetation Management	11	11	11	11
Grider Creek/Gr03 (Scenic)	Harvest	41	41	41	41
	Roadside Hazard	7	7	7	7
South Russian Creek/Ru02 (Recreational)	Fuels Treatments	84	84	84	84
	Harvest	1	1	1	0
	Roadside Hazard	122	122	122	122
	Vegetation Management	29	29	29	29

Source: GIS data sort, dated 02/03/15, 02/04/15

Direct Effects and Indirect Effects

The full scope of the WSR Act's protections can be summarized as requiring Westside Fire Recovery project activities to protect:

7. free-flowing conditions,
8. water quality, and
9. identified "outstandingly remarkable" river value(s).

Free Flowing Conditions

As applied to any river or section of a river, means existing or flowing in natural condition without impoundment, diversion, straightening, rip-rapping, or other modification of the waterway. Although there are portions of harvest units proposed within the river corridor boundaries of the Klamath, Scott, and North Fork Salmon Rivers and Grider Creek, they are located several hundred feet upslope from the river and not proposed within the bed and banks of these WSRs. Therefore the Westside Fire Recovery project proposal would have *no effect* on the free flowing conditions of the Wild and Scenic Rivers, since no activities are proposed within the WSR's bed or banks.

Note: Section 7 of the WSR Act does not apply to this project, because it is only pertinent to a "water resource project" such as a dam, water conduit, reservoir, hydropower project, powerhouse or transmission line, and does not directly affect the bed and bank of a WSR. In 1984 the "water resource project" definition was evaluated for its use within the WSR Act, and the Forest Service clarified that timber harvesting or similar activities would not be subject to Section 7 review unless it resulted in an obstruction or modification of the free-flowing river characteristics (Federal Register Vol. 49, No. 10, 1/16/84, page 1901). Therefore all four alternatives will have *no effect* to free flowing conditions.

Water Quality

All four alternatives are not expected to have direct effect on beneficial uses but should help protect water quality for Elk Creek by fixing existing legacy sites. The alternatives are not expected to increase sediment or stream temperature regimes over alternative 1. A beneficial effect would be legacy site repair. (See Hydrology Report)

Outstandingly Remarkable Value(s)

Each river shall be managed to protect and enhance the values for which the river was designated, while providing for public recreation and resource uses which do not adversely impact or degrade those values. Alternatives 2, 3, 4, and 5 will have no direct effects to vegetation, geologic, or wildlife, values.

Fisheries (Klamath, Scott, North Fork, Elk, Grider)

Minor and insignificant direct effects from water drafting. Over-all effects to sediment, stream shade, and temperature from project treatments are expected to be discountable and effects to aquatic species are expected to be minor under all action alternatives. Should a severe wildfire occur, could result in cumulative impacts to fish associated with increases in sediment supply, localized increases in water temperature, and reduced long-term large woody debris recruitment. Impacts are expected to minor to moderate depending on the spatial pattern of a high intensity wildfire.

Geologic (Elk)

There are no project activities proposed on the Malone landslide, hence no effect to geologic ORV.

Wildlife (Elk)

There are no harvest treatments within the river corridor. Hence the risk to Siskiyou Mountain Salamander habitat is low.

Vegetation (Grider)

A GIS data sort using (BARC data) identified one small stand of old growth (OS tree diameter Class 1 – large to giant 30" + QMD) within the roadside hazard treatment area. This stand, which is located east of Grider Creek (across from the campground) is shown with 0 percent basal area mortality loss. It is likely only a few if any trees would be felled and left in place. Therefore, this will be a negligible effect to the old growth stands.

Wildlife (Grider)

As there are no known Bald Eagle or Peregrine nesting sites within the Grider Creek drainage, there are no direct effects to Wildlife ORV.

Vegetation (South Russian)

There are no project treatments proposed in the Engleman Spruce stands. Hence there will be no direct effects to the Vegetation ORV.

Water Quality (South Russian)

The alternatives have a low risk to increase stream sedimentation and water temperature and are not expected to increase sediment or stream temperature regimes over alternative 1.

Forest WSR Standards and Guidelines

The project treatments associated with the project must meet the Retention and Partial Retention Visual Quality Objectives (VQOs) from within the river corridor, in the foreground beyond the corridor, and in middleground areas visible from the river corridor. For management activities to meet the Retention VQO, the management activity must not be noticeable (see Scenery report). For management activities to meet the Partial Retention VQO, the management activity must remain visually subordinate to the characteristic landscape (see Scenery report).

The noticeable visual disturbances within the Klamath and Scott Rivers, and Grider Creek corridors would likely not meet the assigned Retention Visual Quality Objectives (VQO) in the short term (3-5 years) when visible from the river corridors. Re-sprouting and growth of vegetation will green up disturbed areas to meet the Retention VQO in the long term.

Not meeting a VQO in the three year timeframe inconsistent with Forest Plan Standards and Guidelines numbers MA12-7 and MA13-6. However an exception is allowed under Forest Plan Standards and Guidelines number 11-7 which states "In the case of recovery activities after extreme catastrophic events such as intense wildland fires, time periods to achieve the VQOs stated in Forest-wide and Management Area Standards and Guidelines may be extended. This would be necessary where previously unnoticed scenery alterations are exposed to view due to loss of vegetative screening, or during timber salvage activities where recovery of forest vegetation is determined to be of greater importance than achievement of VQOs within the time periods established."

Cumulative Effects

As there are no direct effects, there are no cumulative effects.

Comparison of Effects

Wild and scenic river effects are displayed by alternative in Table 3-38 below:

Table 3-38: Wild and Scenic River Comparison of Effects of Alternatives

River (Segment #)	River Value	Alternative 1 Description Of Effects	Protected Or Maintained (Y/N)	Alternatives 2, 3, 4, and 5 Description Of Effects	Protected Or Maintained (Y/N)
KLAMATH RIVER (KL01)	Water Quality	Moderate to high risk to water quality (sediment) if legacy sites failed. Low risk to water quality (temperature).	**Y**	Low risk to stream sedimentation and water temperature	**Y**
	Fisheries ORV	No direct effects. Should a severe wildfire occur, could result in cumulative impacts to fish associated with increases in sediment supply, localized increases in water temperature, and reduced long-term large woody debris recruitment. Impacts are expected to minor to moderate depending on the spatial pattern of a high intensity wildfire.	**Y**	Minor and insignificant direct effects from water drafting. Over-all effects to sediment, stream shade, and temperature from project treatments are expected to be discountable and effects to aquatic species are expected to be minor under all action alternatives.	**Y**
	Retention VQO (river corridor)	No Effect	**Y**	VQO would likely **not** be met in short term (3-5 years)	**Y (long term)**
	Partial Retention VQO (middle ground)	No Effect	**Y**	VQO would likely be met	**Y**
SCOTT RIVER (SC01)	Water Quality	Moderate to high risk to water quality (sediment) if legacy sites failed. Low risk to water quality (temperature).	**Y**	Low risk to stream sedimentation and water temperature	**Y**
	Fisheries ORV	No direct effects. Should a severe wildfire occur, could result in cumulative impacts to fish associated with increases in sediment supply, localized increases in water temperature, and reduced long-term large woody debris recruitment. Impacts are expected to minor to moderate depending on the spatial pattern of a high intensity wildfire.	**Y**	Minor and insignificant direct effects from water drafting. Over-all effects to sediment, stream shade, and temperature from project treatments are expected to be discountable and effects to aquatic species are expected to be minor under all action alternatives.	**Y**
	Partial Retention VQO (river corridor)	No Effect	**Y**	VQO would likely be met	**Y**

River (Segment #)	River Value	Alternative 1 Description Of Effects	Protected Or Maintained (Y/N)	Alternatives 2, 3, 4, and 5 Description Of Effects	Protected Or Maintained (Y/N)
	Partial Retention VQO (middle ground)	No Effect	**Y**	VQO would likely be met	**Y**
SCOTT RIVER (SC02)	Water Quality	Moderate to high risk to water quality (sediment) if legacy sites failed. Low risk to water quality (temperature).	**Y**	Low risk to stream sedimentation and water temperature	**Y**
	Fisheries ORV	No direct effects. Should a severe wildfire occur, could result in cumulative impacts to fish associated with increases in sediment supply, localized increases in water temperature, and reduced long-term large woody debris recruitment. Impacts are expected to minor to moderate depending on the spatial pattern of a high intensity wildfire.	**Y**	Minor and insignificant direct effects from water drafting. Over-all effects to sediment, stream shade, and temperature from project treatments are expected to be discountable and effects to aquatic species are expected to be minor under all action alternatives.	**Y**
	Retention VQO (river corridor)	No Effect	**Y**	VQO would likely **not** be met in short term (3-5 years)	**Y (long term)**
	Partial Retention VQO (foreground and middle ground beyond river corridor)	No Effect	**Y**	VQO would likely be met	**Y**
SCOTT RIVER (SC03)	Water Quality	Moderate to high risk to water quality (sediment) if legacy sites failed. Low risk to water quality (temperature).	**Y**	Low risk to stream sedimentation and water temperature	**Y**
	Fisheries ORV	No direct effects. Should a severe wildfire occur, could result in cumulative impacts to fish associated with increases in sediment supply, localized increases in water temperature, and reduced long-term large woody debris recruitment. Impacts are expected to minor to moderate depending on the spatial pattern of a high intensity wildfire.	**Y**	Minor and insignificant direct effects from water drafting. Over-all effects to sediment, stream shade, and temperature from project treatments are expected to be discountable and effects to aquatic species are expected to be minor under all action alternatives.	**Y**

River (Segment #)	River Value	Alternative 1 Description Of Effects	Protected Or Maintained (Y/N)	Alternatives 2, 3, 4, and 5 Description Of Effects	Protected Or Maintained (Y/N)
	Partial Retention VQO (river corridor)	No Effect	**Y**	VQO would likely be met	**Y**
	Partial Retention VQO (foreground and middle ground beyond river corridor)	No Effect	**Y**	VQO would likely be met	**Y**
NORTH FORK SALMON RIVER (NF03)	Water Quality	Moderate to high risk to water quality (sediment) if legacy sites failed. Low risk to water quality (temperature).	**Y**	Low risk to stream sedimentation and water temperature	**Y**
	Fisheries ORV	No direct effects. Should a severe wildfire occur, could result in cumulative impacts to fish associated with increases in sediment supply, localized increases in water temperature, and reduced long-term large woody debris recruitment. Impacts are expected to minor to moderate depending on the spatial pattern of a high intensity wildfire.	**Y**	Minor and insignificant direct effects from water drafting. Over-all effects to sediment, stream shade, and temperature from project treatments are expected to be discountable and effects to aquatic species are expected to be minor under all action alternatives.	**Y**
	Partial Retention VQO (river corridor)	No Effect	**Y**	VQO would likely be met	**Y**
	Partial Retention VQO (foreground and middle ground beyond river corridor)	No Effect	**Y**	VQO would likely be met	**Y**
ELK CREEK (EL03)	Water Quality	Moderate to high risk to water quality (sediment) if legacy sites failed. Moderate risk to water quality from debris flows that affect shade and temperature.	**Y**	High risk for sedimentation may be reduced by legacy site repairs. Moderate risk to water quality from debris flows that affect shade and temperature.	**Y**

River (Segment #)	River Value	Alternative 1 Description Of Effects	Protected Or Maintained (Y/N)	Alternatives 2, 3, 4, and 5 Description Of Effects	Protected Or Maintained (Y/N)
	Fisheries ORV	No direct effects. Should a severe wildfire occur, could result in cumulative impacts to fish associated with increases in sediment supply, localized increases in water temperature, and reduced long-term large woody debris recruitment. Impacts are expected to minor to moderate depending on the spatial pattern of a high intensity wildfire.	**Y**	Minor and insignificant direct effects from water drafting. Over-all effects to sediment, stream shade, and temperature from project treatments are expected to be discountable and effects to aquatic species are expected to be minor under all action alternatives.	**Y**
	Geologic ORV	No Effect	**Y**	No Effect	**Y**
	Partial Retention VQO (river corridor)	No Effect	**Y**	VQO would likely be met	**Y**
	Partial Retention VQO (foreground and middle ground beyond river corridor)	No Effect	**Y**	VQO would likely be met	**Y**
ELK CREEK (EL04)	Water Quality	Moderate to high risk to water quality (sediment) if legacy sites failed. Moderate risk to water quality from debris flows that affect shade and temperature.	**Y**	High risk for sedimentation may be reduced by legacy site repairs. Moderate risk to water quality from debris flows that affect shade and temperature.	**Y**
	Fisheries ORV	No direct effects. Should a severe wildfire occur, could result in cumulative impacts to fish associated with increases in sediment supply, localized increases in water temperature, and reduced long-term large woody debris recruitment. Impacts are expected to minor to moderate depending on the spatial pattern of a high intensity wildfire.	**Y**	Minor and insignificant direct effects from water drafting. Over-all effects to sediment, stream shade, and temperature from project treatments are expected to be discountable and effects to aquatic species are expected to be minor under all action alternatives.	**Y**
	Wildlife ORV	Low risk of habitat disturbance	**Y**	Low risk of habitat disturbance	**Y**

River (Segment #)	River Value	Alternative 1 Description Of Effects	Protected Or Maintained (Y/N)	Alternatives 2, 3, 4, and 5 Description Of Effects	Protected Or Maintained (Y/N)
	Partial Retention VQO (river corridor)	No Effect	**Y**	VQO would likely be met	**Y**
	Partial Retention VQO (foreground and middle ground beyond river corridor)	No Effect	**Y**	VQO would likely be met	**Y**
GRIDER CREEK (GR03)	Water Quality	Moderate to high risk to water quality (sediment) if legacy sites failed. Low risk to water quality (temperature).	**Y**	Low risk to stream sedimentation and water temperature	**Y**
	Fisheries ORV	No direct effects. Should a severe wildfire occur, could result in cumulative impacts to fish associated with increases in sediment supply, localized increases in water temperature, and reduced long-term large woody debris recruitment. Impacts are expected to minor to moderate depending on the spatial pattern of a high intensity wildfire.	**Y**	Minor and insignificant direct effects from water drafting. Over-all effects to sediment, stream shade, and temperature from project treatments are expected to be discountable and effects to aquatic species are expected to be minor under all action alternatives.	**Y**
	Vegetation ORV	No Effect	**Y**	Negligible Effect – a small patch of old growth is within roadside hazard treatment area.	**Y**
	Wildlife ORV	No Effect - No known nesting sites	**Y**	No Effect - No known nesting sites	**Y**
	Retention VQO (river corridor)	No Effect	**Y**	VQO would likely **not** be met in short term (3-5 years)	**Y (long term)**
	Partial Retention VQO (foreground and middle ground beyond river corridor)	No Effect	**Y**	VQO would likely be met	**Y**

River (Segment #)	River Value	Alternative 1 Description Of Effects	Protected Or Maintained (Y/N)	Alternatives 2, 3, 4, and 5 Description Of Effects	Protected Or Maintained (Y/N)
SOUTH RUSSIAN CREEK (RU02)	Water Quality	Moderate to high risk to water quality (sediment) if legacy sites failed. Low risk to water quality (temperature).	**Y**	Low risk to stream sedimentation and water temperature	**Y**
	Vegetation ORV	No Effect. Stands will regenerate naturally.	**Y**	No Effect. No project treatments proposed within Engleman Spruce stands.	**Y**
	Water Quality ORV	No direct effects to water quality (sediment and temperature regimes)	**Y**	Low risk to stream sedimentation and water temperature	**Y**
	Partial Retention VQO (river corridor)	No Effect	**Y**	VQO would likely be met	**Y**
	Partial Retention VQO (foreground and middle ground beyond river corridor)	No Effect	**Y**	VQO would likely be met	**Y**

Compliance with law, regulation, policy, and the Forest Plan

All Wild and Scenic Rivers Act protection requirements will be met for this project. Free flowing conditions, water quality, and identified outstandingly remarkable value(s) will be protected. River classifications will be maintained.

The desired future conditions for both scenic and recreational rivers will be met; scenic river areas and shorelines will remain largely primitive and undeveloped, and recreational river waterways will remain generally natural and riverine in appearance.

Inventoried Roadless Areas

Information on six inventoried roadless areas (IRAs) within the Westside Fire Recovery project area is analyzed in this section, and the effects of the project on these IRAs are disclosed. The detailed history of IRAs and Forest Service direction for management in IRAs is included in the body and appendices of the Inventoried Roadless Area resource report, available on the project website.

Methodology

Geographic Information System (GIS) layers provide information for the location of IRAs and proposed activities that may affect IRAs. A synopsis of the conditions of IRAs at the time the Record of Decision for the Forest Plan was published (1995) is provided in appendix C of the Forest Plan final EIS.

Analysis indicators

Acres of IRA where roadless characteristics potentially will be affected by treatments proposed in the project, and degree of effect, are analysis indicators. Factors used to determine whether or not roadless characteristics will be affected by treatments, identified in the Roadless Area Conservation Rule of 2001 (36 CFR Part 294), are effects on:

- High quality or undisturbed soil, water and air resources;
- Sources of public drinking water;
- Diversity of plant and animal communities;
- Habitat for Threatened, Endangered, Proposed, Candidate, and Sensitive species and species dependent on large undisturbed areas of land;
- Primitive, semi-primitive non-motorized, and semi-primitive motorized classes of recreation;
- Reference landscapes for research study or interpretation;
- Natural appearing landscapes with high scenic quality;
- Traditional cultural properties and sacred sites; and
- Other locally identified unique characteristics.

The effects of the project on the currently roadless portions of IRAs and the portions that include roads are analyzed and disclosed separately because retaining roadless character is difficult, if not impossible, in areas of IRAs that already include roads.

Spatial and temporal bounding

The spatial boundary for analysis includes the IRAs within the project area boundary because only activities that occur within the IRAs affect the roadless characteristics of the IRAs.

The short-term temporal bounding is one to five years because effects will be realized during and shortly after project implementation. The long-term timeframe is 20 years because effects will fade by the end of that time.

Affected Environment

There are six IRAs within the Westside Fire Recovery project area. Four of these IRAs are totally or partially within the Happy Camp Fire area: Grider; Johnson; Kelsey; and Tom Martin. Two IRAs are partially within the Whites Fire area: Russian; and Snoozer. Only Grider and Snoozer IRAs retain a roadless character for the entire IRA; roads were constructed in portions of the other IRAs between 1984, when these IRAs were "released" for road construction and other activities by the California Wilderness Act, and 2001 when the Roadless Area Conservation Rule limiting road construction and associated activities in IRAs was published. The total number of acres in each IRA within the project area, the acres that are considered to retain their roadless character because no roads were constructed in them, and the acres that no longer retain roadless character are displayed in table 3-39.

Table 3-39: Acres within each IRA, and within the portions of each IRA that retain roadless character

IRA	Total Acres of IRA within project area	Acres that retain roadless character	Acres that do not retain roadless character
Grider	**10,640**	10,640	0
Johnson	**4,900**	3,970	930
Kelsey	**3,230**	510	2,720
Russian	**13,540**	11,910	1,630
Snoozer	**9,250**	9,250	0
Tom Martin	**9,050**	5,650	3,400
TOTAL	**50,610**	**41,930**	**8,680**

Environmental Consequences

Alternative 1

Direct and Indirect Effects

Since there are no management actions with this alternative, there will be no direct or indirect effects on IRAs.

Cumulative Effects

Since there are no direct or indirect effects, there are no cumulative effects of adding the zero effects of alternative 1 to the past, ongoing or reasonable foreseeable future actions listed in appendix C that overlap IRAs in time or space.

Alternative 2

Direct and Indirect Effects

The direct or indirect effects on roadless characteristics in IRAs are based on the type and extent of activities within each IRA, especially within the roadless portions since the roadless characteristics of the roaded portions have already been affected. Acres of IRAs within the project boundary that retain roadless character and those that do not are displayed in table 3-40.

Table 3-40: Alternative 2 proposed activities within each IRA, in portions that retain and do not retain roadless character

IRA	Acres within IRA	% of IRA with Activity	Acres within IRA retaining roadless character	% of IRA with Activity retaining roadless character	Acres within IRA no longer retaining roadless character	% of IRA with Activity no longer retaining roadless character
Grider	**125**	**1 %**	**125**	**1 %**	**0**	**0 %**
Fuels Treatment	43	<1 %	43	<1 %	0	0 %
Site prep./plant	82	1 %	82	1 %	0	0 %
Johnson	**345**	**7 %**	**152**	**4 %**	**192**	**21 %**
Fuels Treatment	160	3 %	114	3 %	47	5 %
Site prep./plant	184	4 %	39	1 %	146	16 %
Kelsey	**44**	**1 %**	**0**	**0 %**	**44**	**2 %**
Fuels Treatment	0	0 %	0	0 %	0	0 %
Site prep./plant	44	1 %	0	0 %	44	2 %
Russian	**2,066**	**15 %**	**1,822**	**15 %**	**245**	**15 %**
Fuels Treatment	1,935	14 %	1,782	15 %	153	9 %
Site prep./plant	131	1 %	39	<1 %	92	6 %
Snoozer	**3,459**	**37 %**	**3,459**	**37 %**	**0**	**0 %**
Fuels Treatment	3,459	37 %	3.459	37 %	0	0 %
Site prep./plant	0	0 %	0	0 %	0	0 %
Tom Martin	**261**	**3 %**	**50**	**1 %**	**210**	**6 %**
Fuels Treatment	213	2 %	50	1 %	163	5 %
Site prep./plant	47	<1 %	0	0 %	47	1 %
TOTAL	**6,300**	**12 %**	**5,608**	**13 %**	**692**	**8 %**
Fuels Treatment	**5,811**	**11 %**	**5,448**	**13 %**	**363**	**4 %**
Site prep./plant	**489**	**1 %**	**160**	**<1 %**	**329**	**4 %**

Cumulative Effects

Adding the effects of alternative 2 to the past, ongoing or reasonable foreseeable future actions listed in appendix C that overlap IRAs in time and space will produce negligible cumulative effects to roadless characteristics. Few if any proposed projects on the Forest include any treatments in IRAs and IRAs do not exist on private lands.

Alternative 3

Direct and Indirect Effects

The actions proposed in this alternative are the same as alternative 2; therefore, direct and indirect effects will be the same as for alternative 2.

Cumulative Effects

Adding the effects of alternative 3 to the past, ongoing or reasonable foreseeable future actions listed in appendix C will produce the same cumulative effects to roadless characteristics as for alternative 2.

Alternative 4

Direct and Indirect Effects

The actions proposed in this alternative are the same as alternative 2; therefore, direct and indirect effects will be the same as for alternative 2.

Cumulative Effects

Adding the effects of alternative 3 to the past, ongoing or reasonable foreseeable future actions listed in appendix C will produce the same cumulative effects to roadless characteristics as for alternative 2.

Alternative 5

Direct and Indirect Effects

IRA	Acres within IRA	% of IRA with Activity	Acres within IRA retaining roadless character	% of IRA with Activity retaining roadless character	Acres within IRA no longer retaining roadless character	% of IRA with Activity no longer retaining roadless character
Grider	**43**	**<1 %**	**43**	**<1 %**	**0**	**0 %**
Fuels Treatment	43	<1 %	43	<1 %	0	0 %
Site prep./plant	0	0 %	0	0 %	0	0 %
Johnson	**160**	**3 %**	**114**	**3 %**	**47**	**5 %**
Fuels Treatment	160	3 %	114	3 %	47	5 %
Site prep./plant	0	0 %	0	0 %	0	0 %
Kelsey	**0**	**0 %**	**0**	**0 %**	**0**	**0 %**
Fuels Treatment	0	0 %	0	0 %	0	0 %
Site prep./plant	0	0 %	0	0 %	0	0 %
Russian	**1,935**	**14 %**	**1,782**	**15 %**	**153**	**9 %**
Fuels Treatment	1,935	14 %	1,782	15 %	153	9 %
Site prep./plant	0	0 %	0	0 %	0	0 %
Snoozer	**3,459**	**37 %**	**3,459**	**37 %**	**0**	**0 %**
Fuels Treatment	3,459	37 %	3,459	37 %	0	0 %
Site prep./plant	0	0 %	0	0 %	0	0 %
Tom Martin	**213**	**2 %**	**50**	**1 %**	**163**	**5 %**
Fuels Treatment	213	2 %	50	1 %	163	5 %
Site prep./plant	0	0 %	0	0 %	0	0 %

IRA	Acres within IRA	% of IRA with Activity	Acres within IRA retaining roadless character	% of IRA with Activity retaining roadless character	Acres within IRA no longer retaining roadless character	% of IRA with Activity no longer retaining roadless character
TOTAL	**5,811**	**11 %**	**5,448**	**13 %**	**363**	**4 %**
Fuels Treatment	**5,811**	**11 %**	**5,448**	**13 %**	**363**	**4 %**
Site prep./plant	**0**	**0 %**	**0**	**0 %**	**0**	**0 %**

No site preparation and planting actions are proposed in IRAs in this alternative as noted below in table 3-41. The direct and indirect effects on roadless characteristics are due to fuels treatments.

Table 3-41: Alternative 5 proposed activities within each IRA, in portions that retain and do not retain roadless character

Cumulative Effects

Adding the effects of alternative 3 to the past, ongoing or reasonable foreseeable future actions listed in appendix C that overlap IRAs in time and space will produce negligible cumulative effects to roadless characteristics.

Comparison of Effects

There is little difference among alternatives in effects on roadless character of IRAs because the treatments proposed in any alternative have little effect on the roadless areas that retain roadless characteristics. Alternative 1 does not propose any treatments in IRAs; IRAs will renerate naturally as described in the vegetation section of this chapter . In action alternatives, only prescribed burning affects a sizeable number of acres; this action mimics the effects of low intensity wildfire and will not substantially affect roadless character. Construction and maintenance of shaded fuel breaks on a small number of acres that retain their roadless characteristic and removal of small fuels (generally less than 3 inches in diameter at breast height) will also not substantially affect roadless character. Site preparation and planting using hand tools and methods in alternatives 2, 3 and 4 (with implementation of project design feature IRA-1) will have a minor effect; this will occur on only 160 acres of areas that currently retain roadless character. No site preparation and planting will occur in alternative 5; effects of natural regeneration will be the same as for alternative 1.

Compliance with law, policy, regulation and the Forest Plan

All alternative will comply with the Roadless Area Conservation Rule and applicable Forest Plan standards as amended by this rule.

Climate Change

Increasingly, the relationships between human-caused emissions, climate change, and the role of the forests as carbon sinks (carbon sequesters) are being documented (IPCC 2007). Although uncertainty exists in quantifying the impact of emissions on climate, a global warming of 1.4 to 5.8 degrees centigrade is projected by 2100 (USDA Forest Service 2007b). Adapting to climate change and its potential impacts poses challenges and opportunities to managing resources. Forests and rangelands are seen as part of the solution to reducing atmospheric carbon dioxide and other greenhouse gases due to their ability to sequester or store carbon. However, the magnitude of the opportunity for carbon storage is not well quantified or thoroughly understood, especially at the project level.

The use of future climate scenarios and ecological models suggests that the impact of climate change on ecosystems in the United States may include increases in ecosystem productivity in the short term and shifts in the distribution of plants and animals in the long term (Joyce and Birdsey 2000). As climate changes advance, there are some indications that there will be increases in disturbances such as wildfires, drought, and insects (USDA Forest Service 2007b).

Although climate change simulations vary considerably in making future predictions of climate change, in most scenarios relatively little change in overall precipitation is projected. Most precipitation will continue to occur during winter storms. However, increased winter temperatures may mean that more of the winter precipitation falls as rain and less as snow. Snow accumulations may decrease and spring snow melt is projected to occur earlier. There is no local scientific information to suggest that storms may increase in size or frequency so no projections are made concerning the effects of storm events on the project area. Dry seasons may be drier, warmer and longer, with resulting increases in the frequency and size of wildfires as seen in 2014. This project may allow some adaptation to climate change effects on the local level.

Based on the best available science, it is still speculative to factor any specific ecological trends or substantial changes in climate into the analysis of environment impacts of individual projects. Currently, the best available science concerning climate change is not adequate to support reliable predictions about ecological interactions and trends at the local project level. Local information concerning precipitation and temperature in the vicinity of the Westside Fire Recovery project suggests that national predictions on increasing temperature may be reflected at the project level but precipitations trends are more variable (USDA Forest Service 2011b). Based on regional predictions of a warming climate and increases in disturbances such as wildfire and insect infestations, it is expected that treatments proposed in the action alternatives for this project will benefit forests through fuel-reduction treatments designed to promote species diversity, favor fire-resistant tree species, and reduce risk of loss due to wildfire. Specifically, the following may occur:

- Increases in average temperatures, with earlier snowmelt, may lead to an increase in the size and frequency of wildfires with warmer and longer fire seasons as was evident in 2014
- Harvest of burned areas can reduce fuels, especially those that are slow to ignite but burn at high intensities lead heated soils that damage soil productivity.
- From our current state of understanding, climate change may bring about increases in insect and pathogen outbreaks.

The contribution of this project to factors that may affect climate change such as greenhouse gas emissions is disclosed in the Air Quality section of this chapter and referenced Air Quality resource report. The contribution to carbon sequestration is disclosed in the Vegetation section of this chapter and referenced Vegetation resource report. Managing forests for carbon sequestration is a poorly understood science but active forest management is believed to be an effective method of carbon sequestration (IPCC 2007). Selecting trees for reforestation that are likely to survive if climate change predictions are fulfilled in the project area is also discussed in the discussion of site preparation and planting in the Vegetation section. Harvest, fuel breaks and other fuel-reduction treatments will not eliminate wildfire from the project area but can help change fire behavior (as discussed in the Fire and Fuels section of this chapter and Fire and Fuels resource report, thereby likely reducing carbon dioxide emissions resulting from wildfire. Effects on future global climate change from this project are too small to measure.

Short-term Uses and Long-term Productivity

NEPA requires consideration of "the relationship between short-term uses of man's environment and the maintenance and enhancement of long-term productivity" (40 CFR 1502.16). As declared by the Congress, this includes using all practicable means and measures, including financial and technical assistance, in a manner calculated to foster and promote the general welfare, to create and maintain conditions under which man and nature can exist in productive harmony, and fulfill the social, economic, and other requirements of present and future generations of Americans (NEPA Section 101).

Short-term uses are those that occur within the first few years of project implementation. Long-term productivity refers to the capability of the land and resources to continue producing goods and services long after the project is complete. Harvesting or salvaging of standing trees can be considered a short-term use of a renewable resource. Trees can be reestablished and grow if the long-term productivity of the land is maintained. Long-term productivity is maintained through application of management requirements described in Chapter 2, in particular those applicable to soil and water resources.

The action alternatives (2, 3, 4 and 5) all would provide for the long-term productivity of the project area through removal of biomass and other fuel reduction actions creating a resilient forest where areas can recover from future fire effects naturally. Harvesting or salvaging standing trees will generate short-term economic returns through the sale of salvage timber, as well as providing for worker and public safety in the most critical areas within a short timeframe.

Unavoidable Adverse Effects

Implementation of any of the alternatives would result in some unavoidable adverse environmental effects. Although formation of the alternatives included avoidance of some effects, other adverse effects could occur that cannot be completely mitigated. The environmental consequences section for each resource area discusses these effects.

Irreversible and Irretrievable Commitments of Resources

Irreversible commitments of resources are those that cannot be regained, such as the extinction of a species or the removal of a mined ore. No irreversible commitments of resources would result from implementation of any of the alternatives because no permanent, irreversible resource loss would occur.

Irretrievable commitments are those that are lost for a period of time such as the temporary loss of timber productivity in forested areas that are kept clear for use as a power line right-of-way or road. Irretrievable losses can be regained over time. Implementation of all action alternatives would not irretrievably commit resources, but help in the long-term recovery of the landscape.

Legal and Regulatory Compliance

The National Environmental Policy Act of 1969 (NEPA) requires that all major federal actions significantly affecting the human environment be analyzed to determine the magnitude and intensity of those impacts and that the results be shared with the public and the public given opportunity to comment. The regulations implementing NEPA further require that to the fullest extent possible, agencies shall prepare EISs concurrently with and integrated with environmental analyses and related surveys and studies required by the Endangered Species Act of 1973, the National Historic Preservation Act of 1966, and other environmental review laws and executive orders. Other laws and regulations that apply to this project are described below

Clean Air Act

The Clean Air Act of 1970 provides for the protection and enhancement of the nation's air resources. No exceeding of the federal and state ambient air quality standards is expected to result from any of the alternatives. The Clean Air Act makes it the primary responsibility of States and local governments to prevent air pollution and control air pollution at its source. All alternatives are compliant with the Clean Air Act and the Conformity Rule. See the air quality section of chapter 3 for details.

Clean Water Act

The Clean Water Act of 1948 (as amended in 1972 and 1987) establishes federal policy for the control of point and non-point pollution, and assigns the states the primary responsibility for control of water pollution. The Clean Water Act regulates the dredging and filling of freshwater and coastal wetlands. Section 404 (33 USC 1344) prohibits the discharge of dredged or fill material into waters (including wetlands) of the United States without first obtaining a permit from the U.S. Army Corps of Engineers. Wetlands are regulated in accordance with federal Non-Tidal Wetlands Regulations (Sections 401 and 404). No dredging or filling is part of this project and no permits are required.

Legacy sediment sites were identified since scoping and will be scheduled for treatment in compliance with the Clean Water Act as a condition of the North Coast Regional Water Quality Control Board waiver of waste discharge requirements (Order No. R1-2010-0029). Compliance of this project will be met through a waiver application and approval process with the board, following the decision. See the hydrology section of chapter 3 for more information about the Clean Water Act.

Endangered Species Act

Section 7 (d) of the Endangered Species Act of 1973 requires that after initiation of consultation required under section 7(a)(2), a Federal agency "shall not make any irreversible or irretrievable commitment of resources with respect to the agency action which has the effect of foreclosing the formulation or implementation of any reasonable and prudent alternative which would not violate subsection (a)(2)." The Forest Service is undergoing consultation with the U.S. Fish and Wildlife Service and NOAA Fisheries for this project and will comply with the Endangered Species Act.

National Historic Preservation Act

The National Historic Preservation Act of 1966 as amended "requires federal agencies to take into account the effects of their undertakings on historic properties." This is accomplished through a four-step process following 36 CFR Part 800, the implementing regulations for Section 106 of the National Historic Preservation Act. The regulations allow alternative procedures for meeting Section 106 to be developed through programmatic agreements. The Pacific Southwest Region of the Forest Service (Region 5) which includes the Forest has entered into a programmatic agreement for complying with Section 106. Additionally, the Forest developed the Westside Fire Recovery PA to address project specific issues and concerns. The Westside Fire Recovery PA allows limited project activities to occur within certain historic properties without adverse effects, as long as project-specific Standard Resource Protection Measures (SRPMs) are applied. The Westside Fire Recovery PA--developed in consultation with the California State Historic Preservation Officer, the Advisory Council on Historic Preservation, and local tribes--tiers to the Regional PA and meets the requirements for compliance under Section 106 of the National Historic Preservation Act.

National Forest Management Act

The National Forest Management Act of 1976 amends the Forest and Rangeland Renewable Resources Planning Act of 1974 and sets forth the requirements for Land and Resource Management Plans for the National Forest System. Through consistency with the Forest Plan (as amended) this project is consistent with National Forest Management Act. A Forest Plan consistency checklist is available in the project record.

Executive Orders

The project will be consistent with all applicable executive orders.

Chapter 4 Consultation and Coordination

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The Forest Service consulted the following individuals, Federal, State, and local agencies, tribes and non-Forest Service persons during the development of this environmental assessment:

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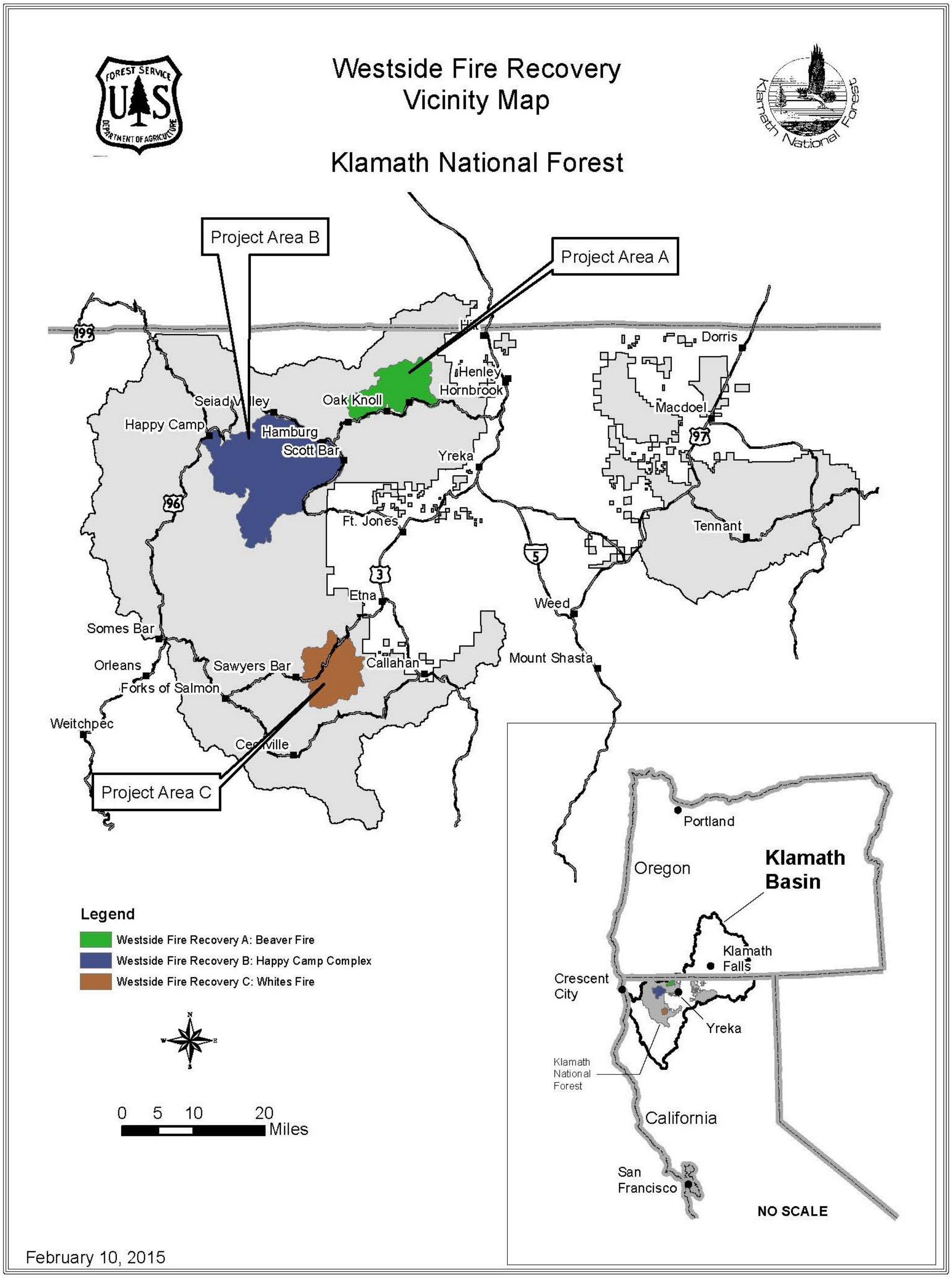
Appendix A: Vicinity and Alternative Treatment Maps



Map A-1: Westside Fire Recovery Vicinity Map

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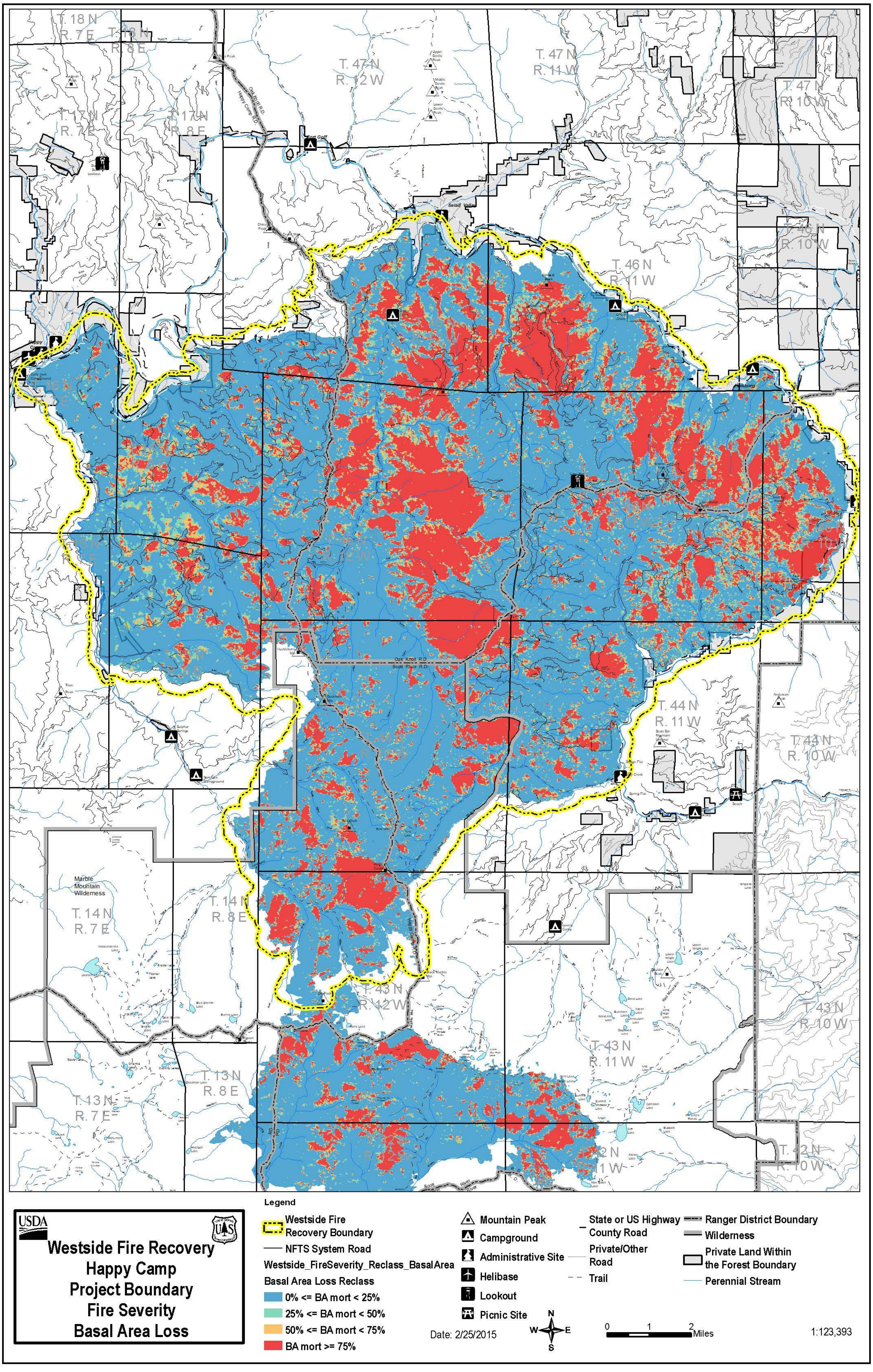

Map A-2: RAVG Map – Happy Camp Complex

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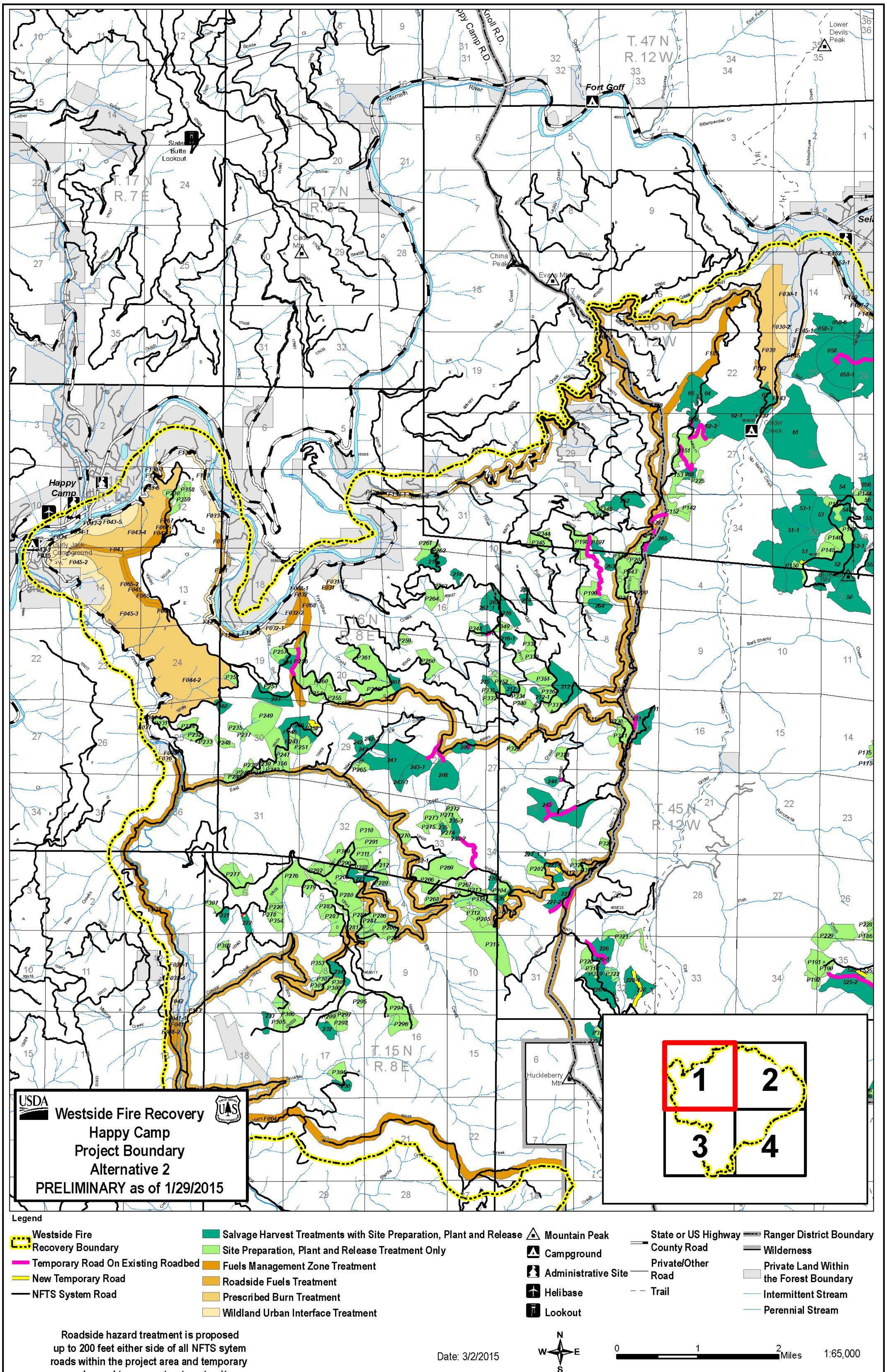

Map A-3: Alternative 2 – northwest section of the Happy Camp Complex. Please note: Each alternative of the Happy Camp complex has been broken out into four sections to allow for clarity and readability

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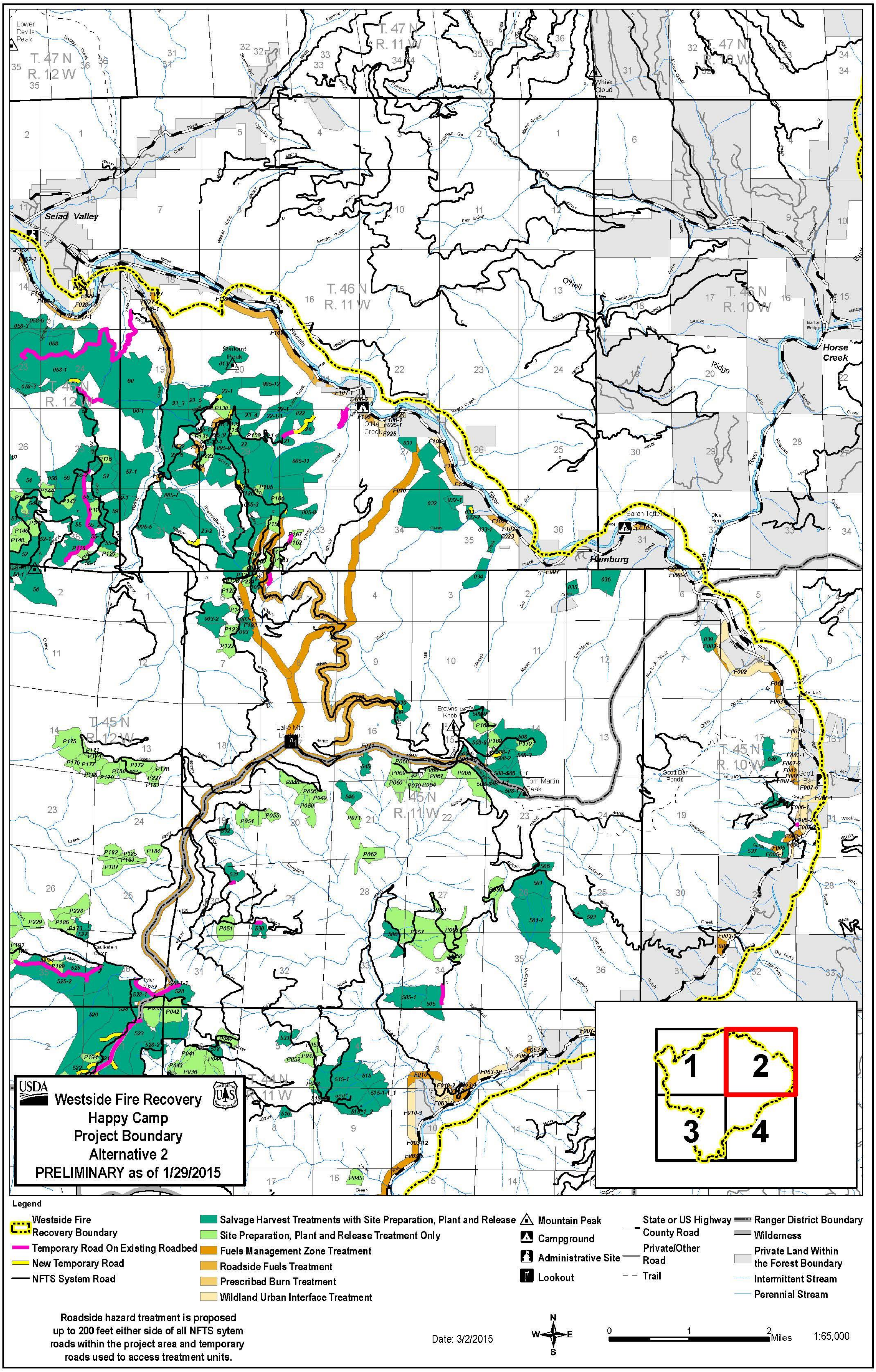

Map A-4: Alternative 2 – northeast section of the Happy Camp Complex

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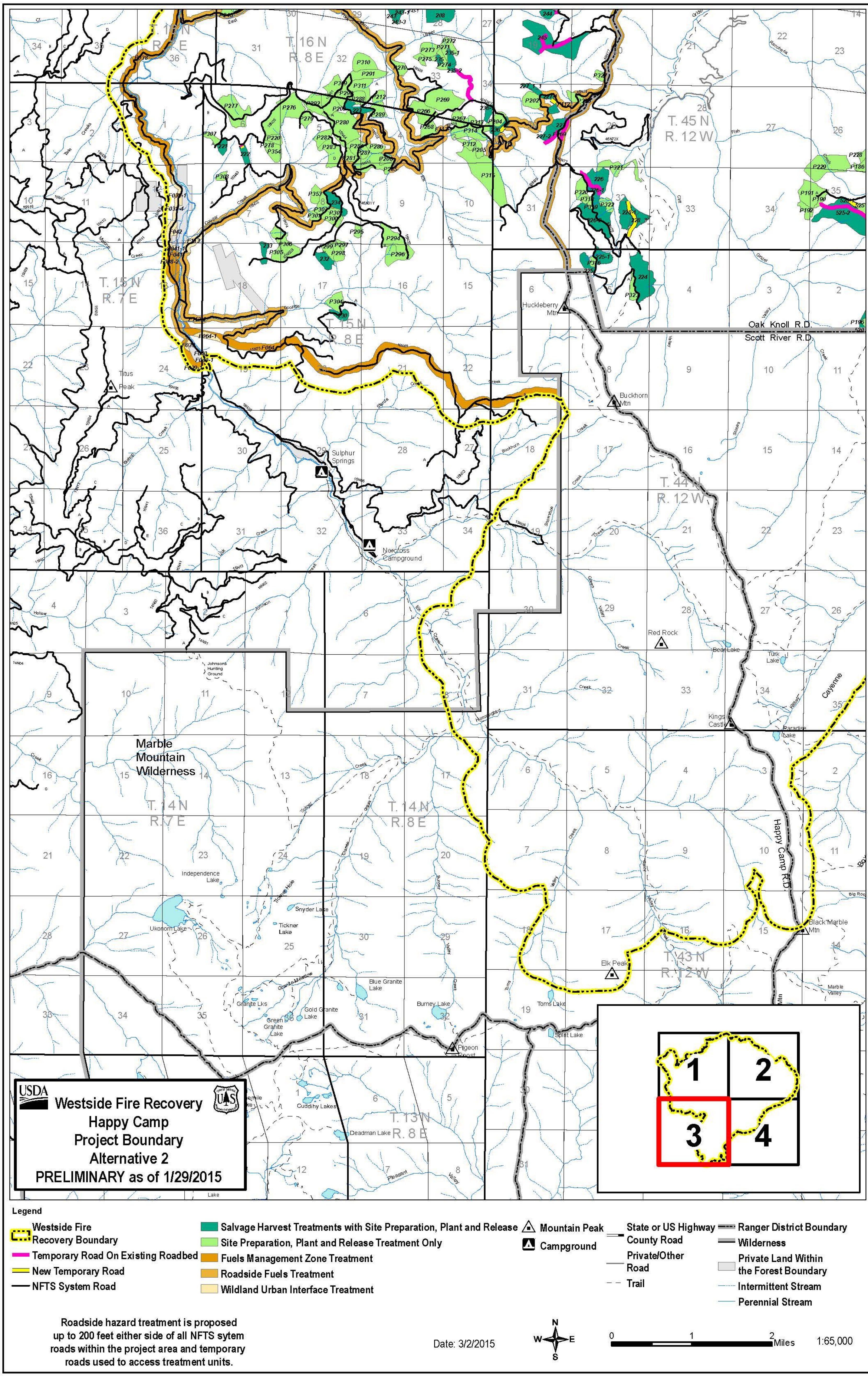

Map A-5: Alternative 2 – northeast section of the Happy Camp Complex

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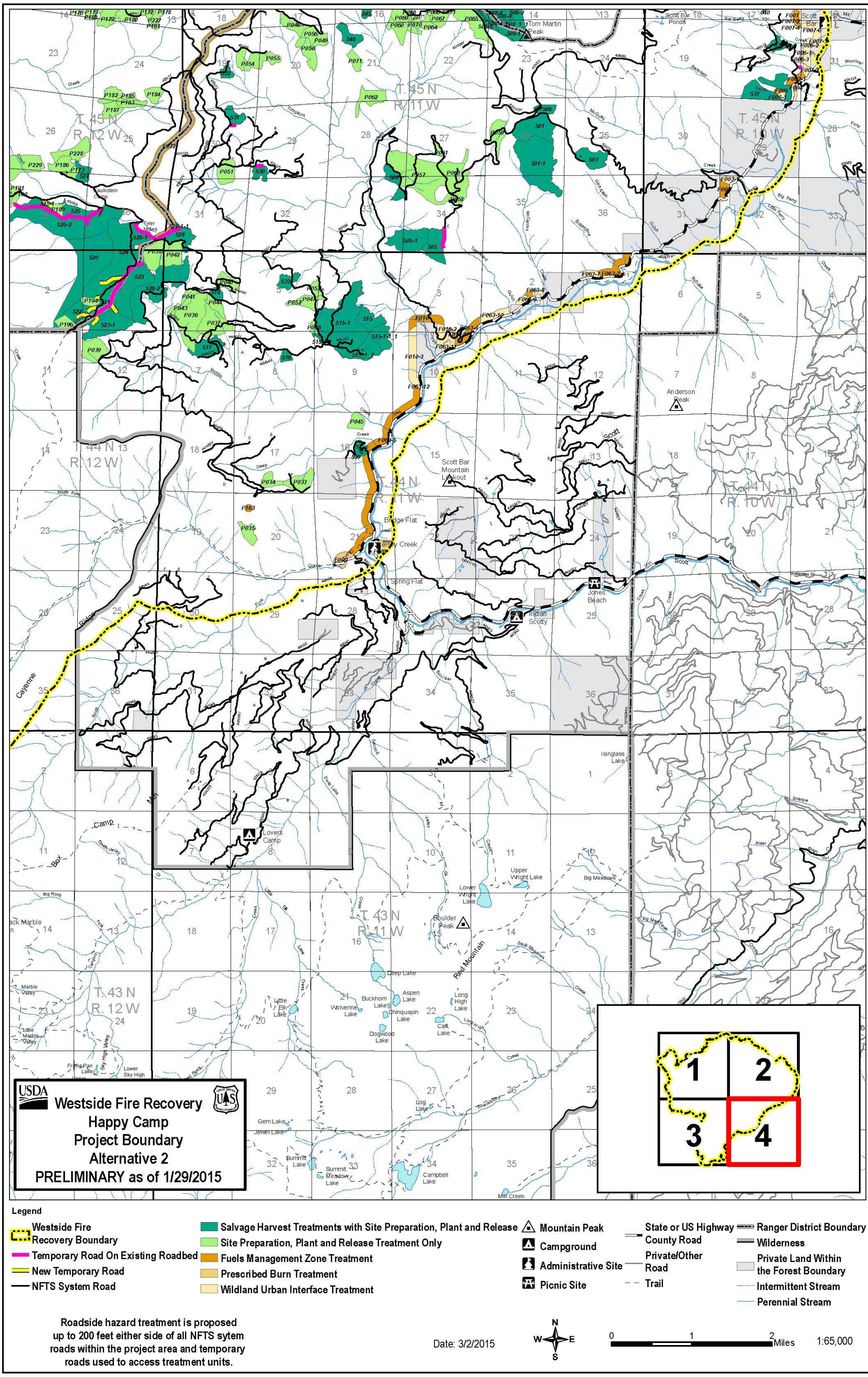

Map A-6: Alternative 2 – southeast section of the Happy Camp Complex

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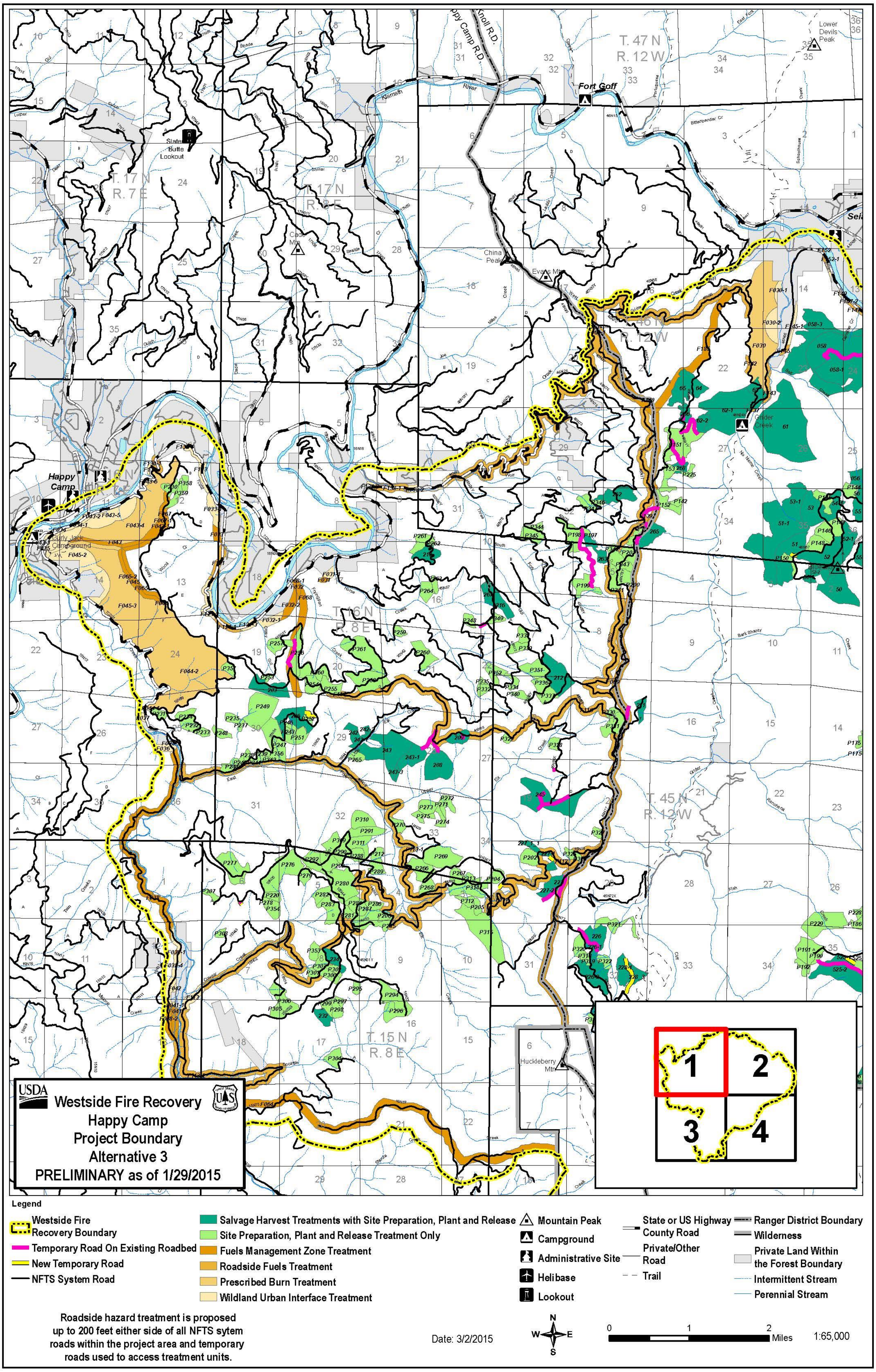

Map A-7: Alternative 3 – northwest section of the Happy Camp Complex

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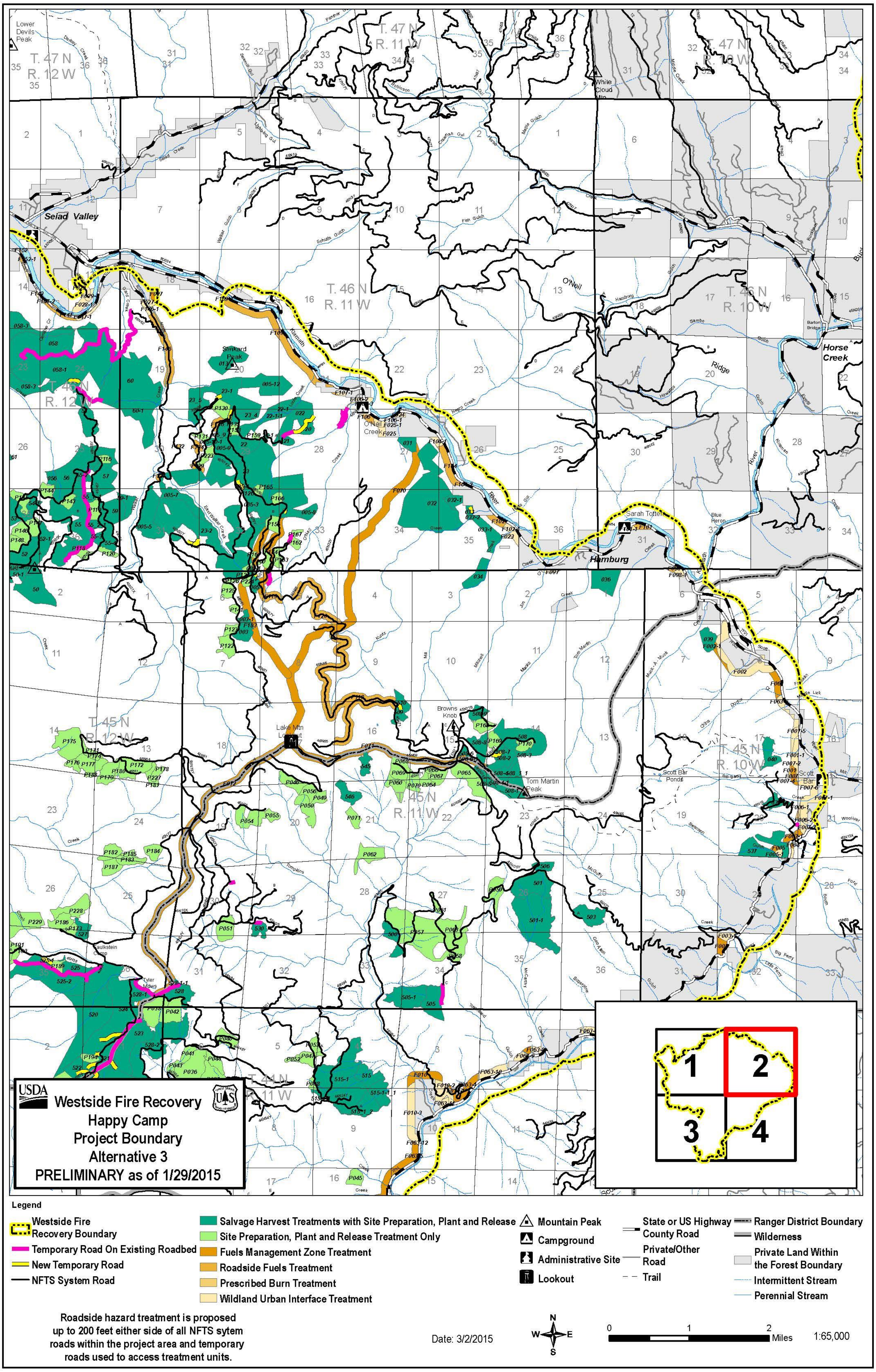

Map A-8: Alternative 3--northeast section of the Happy Camp Complex

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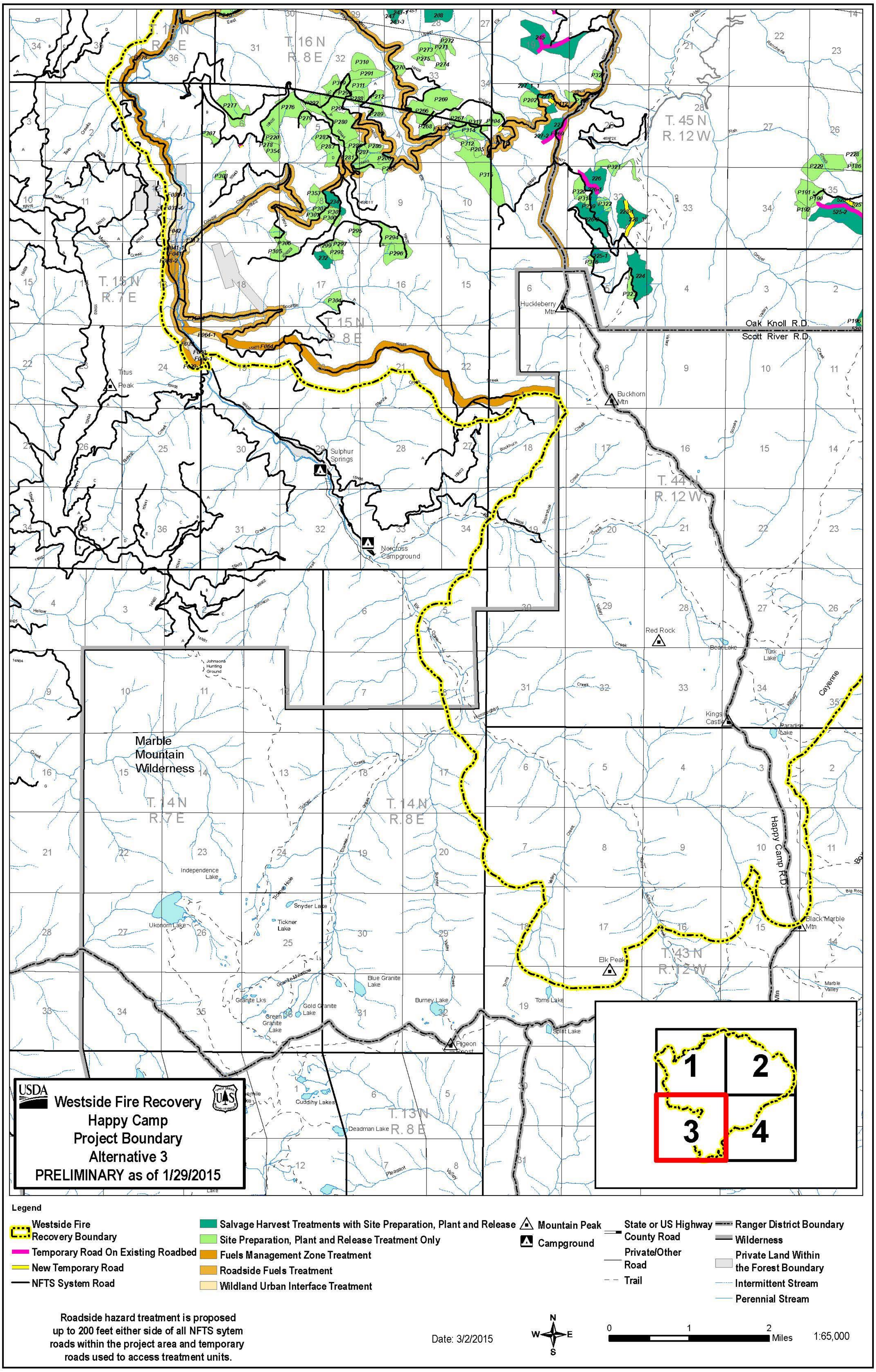

Map A-9: Alternative 3 – southwest section of the Happy Camp Complex

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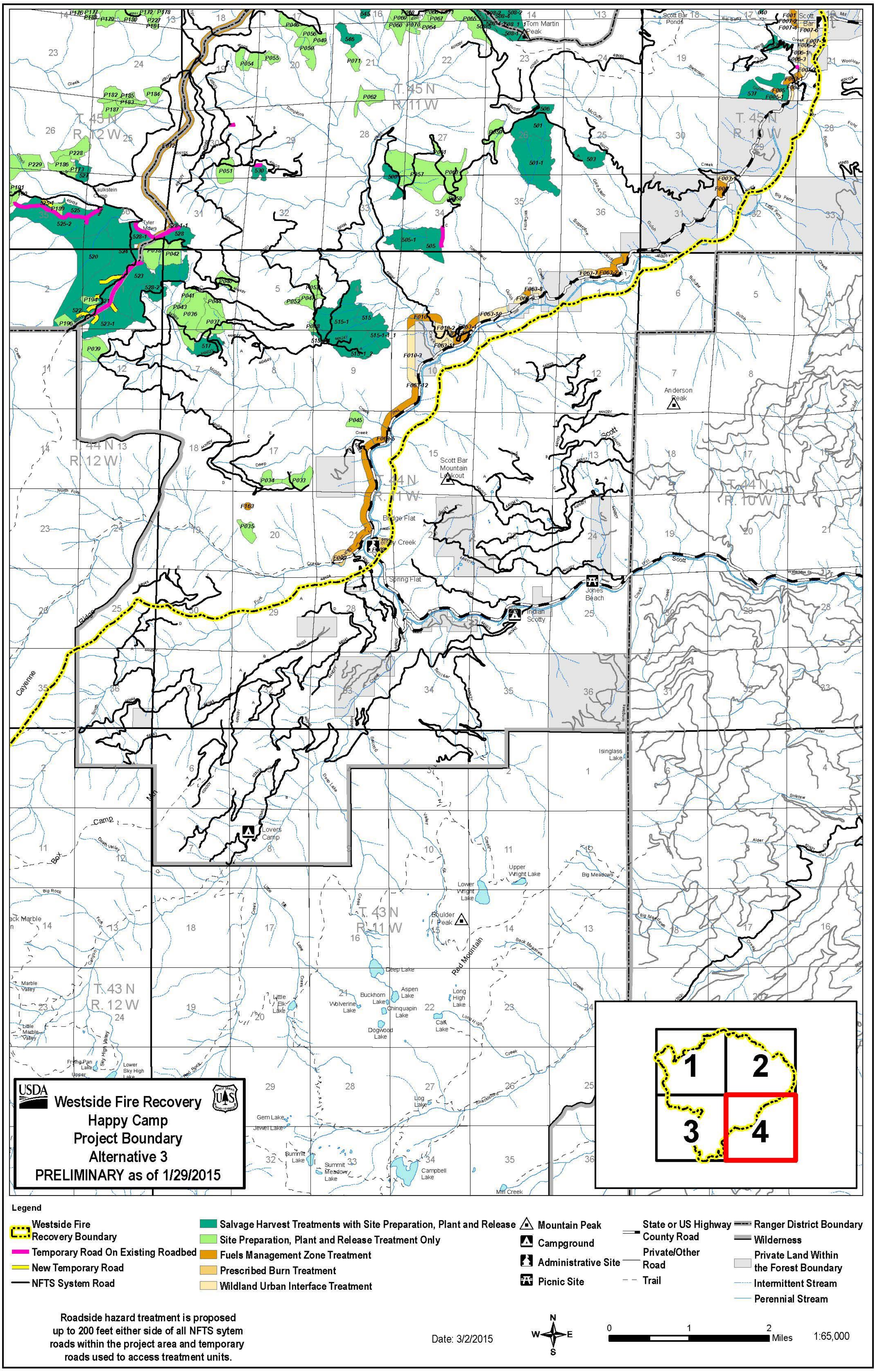

Map A-10: Alternative 3 – southeast section of the Happy Camp Complex

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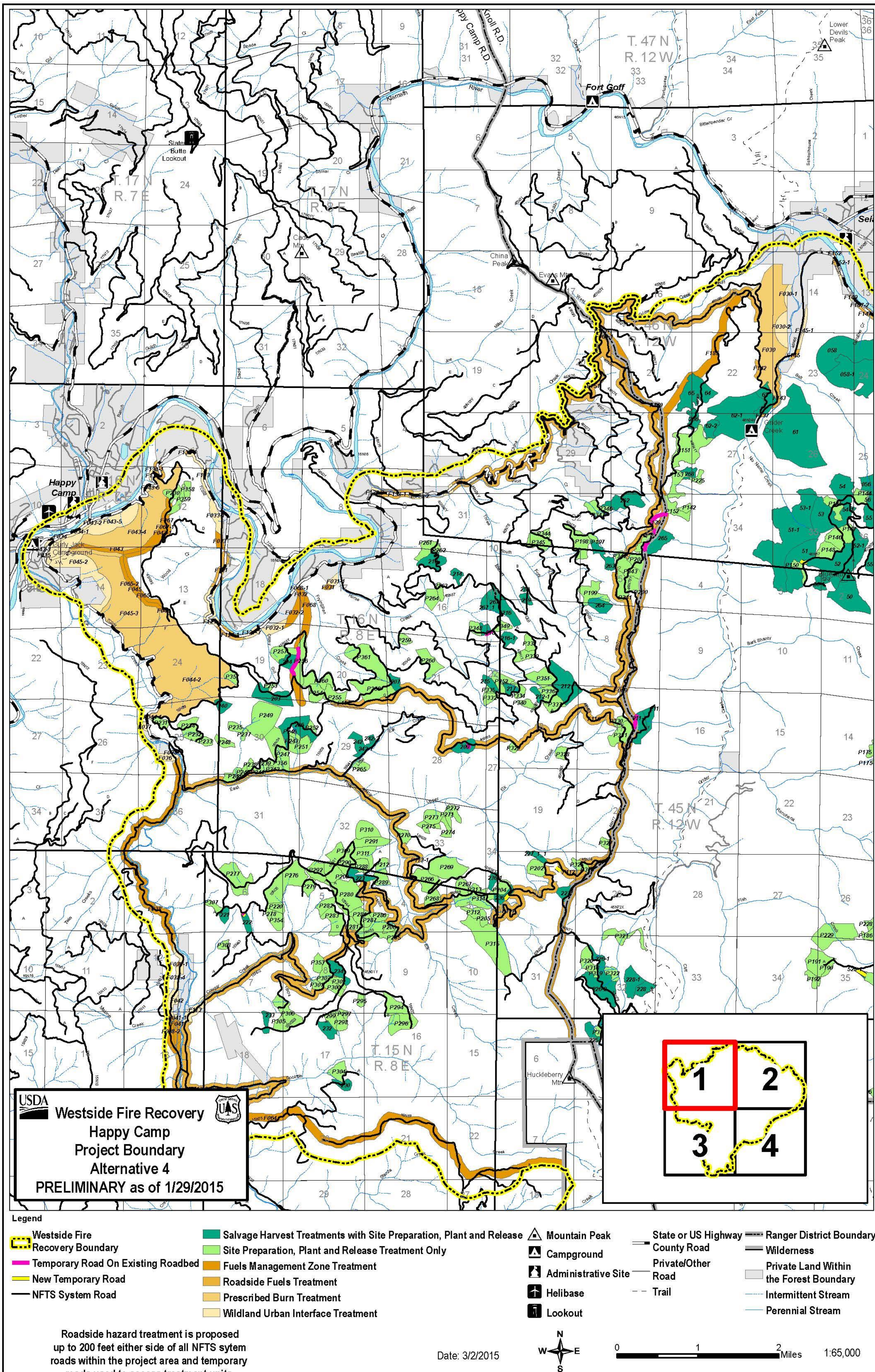

Map A-11: Alternative 4--northwest section of the Happy Camp Complex

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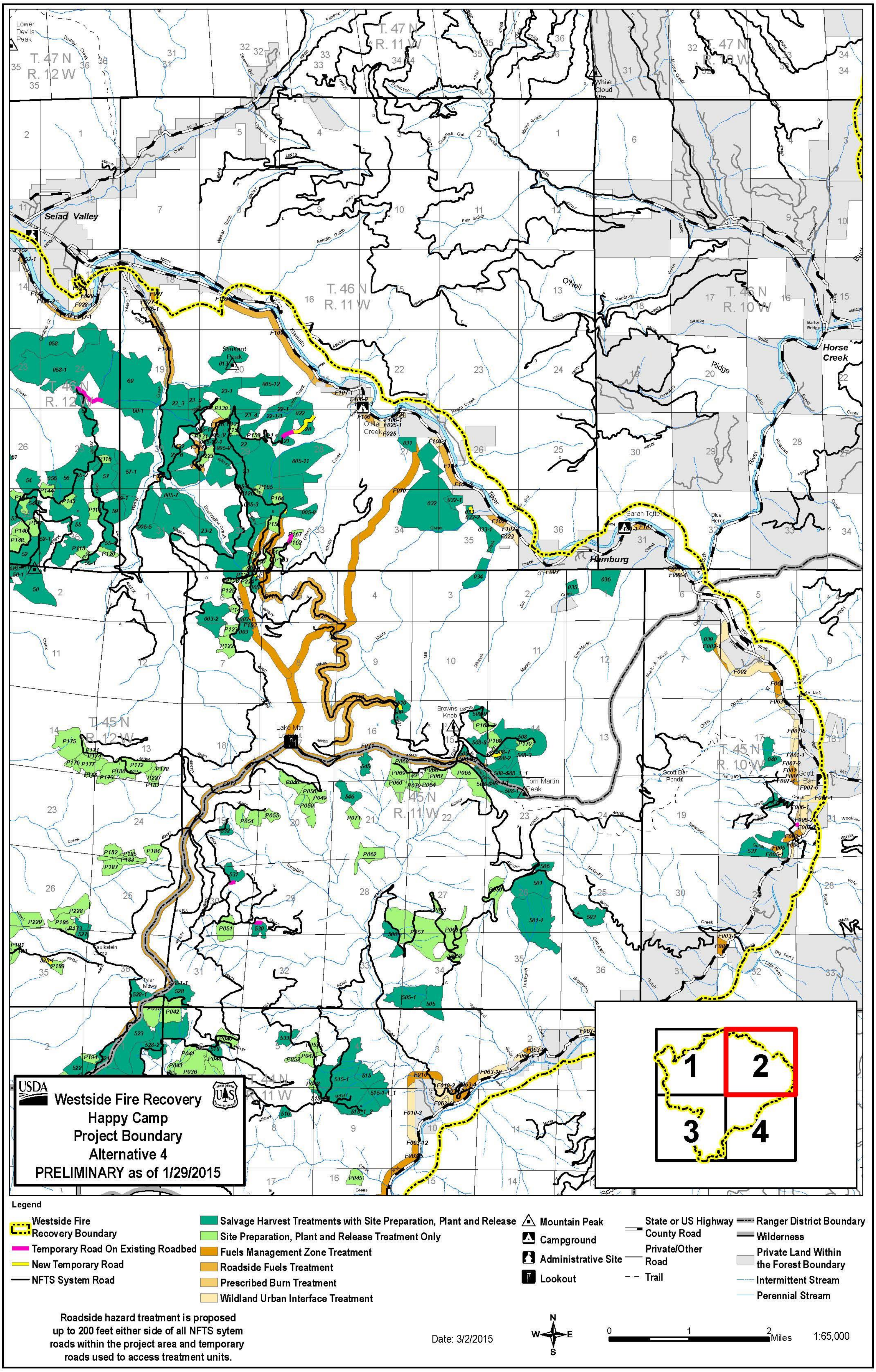

Map A-12: Alternative 4 – northeast section of the Happy Camp Complex

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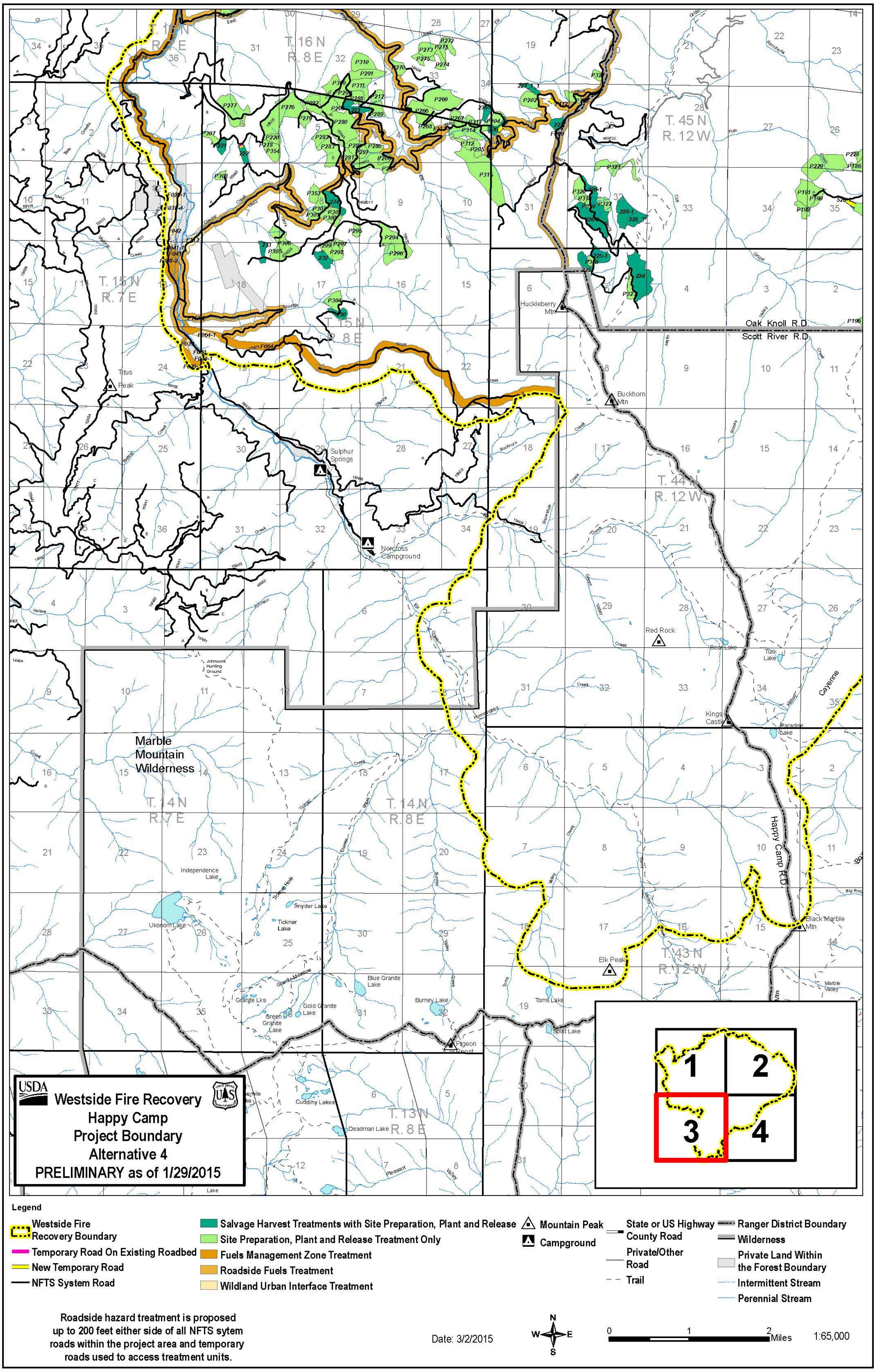

Map A-13: Alternative 4 – southwest section of the Happy Camp Complex

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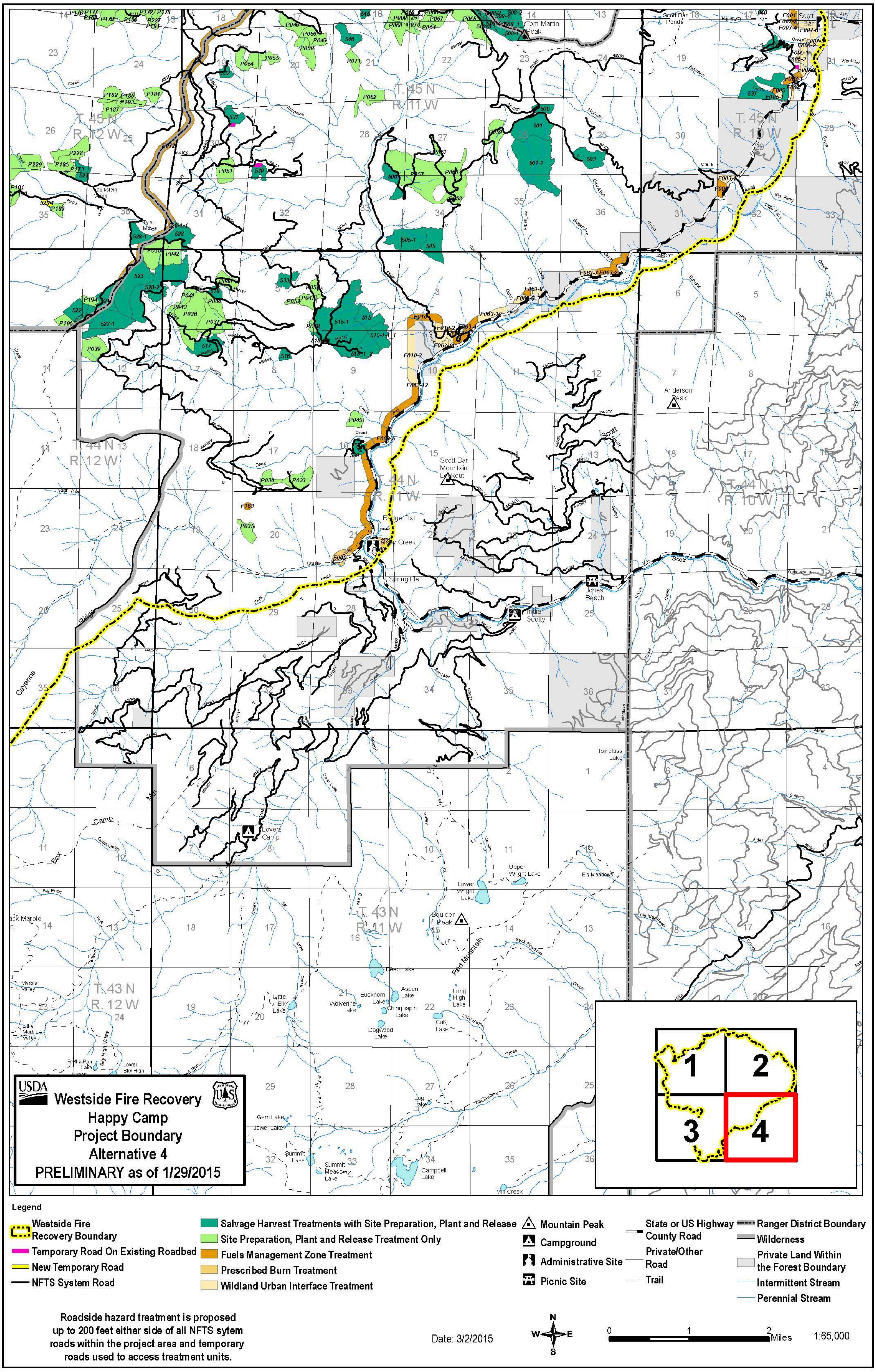

Map A-14: Alternative 4 – southeast section of the Happy Camp Complex

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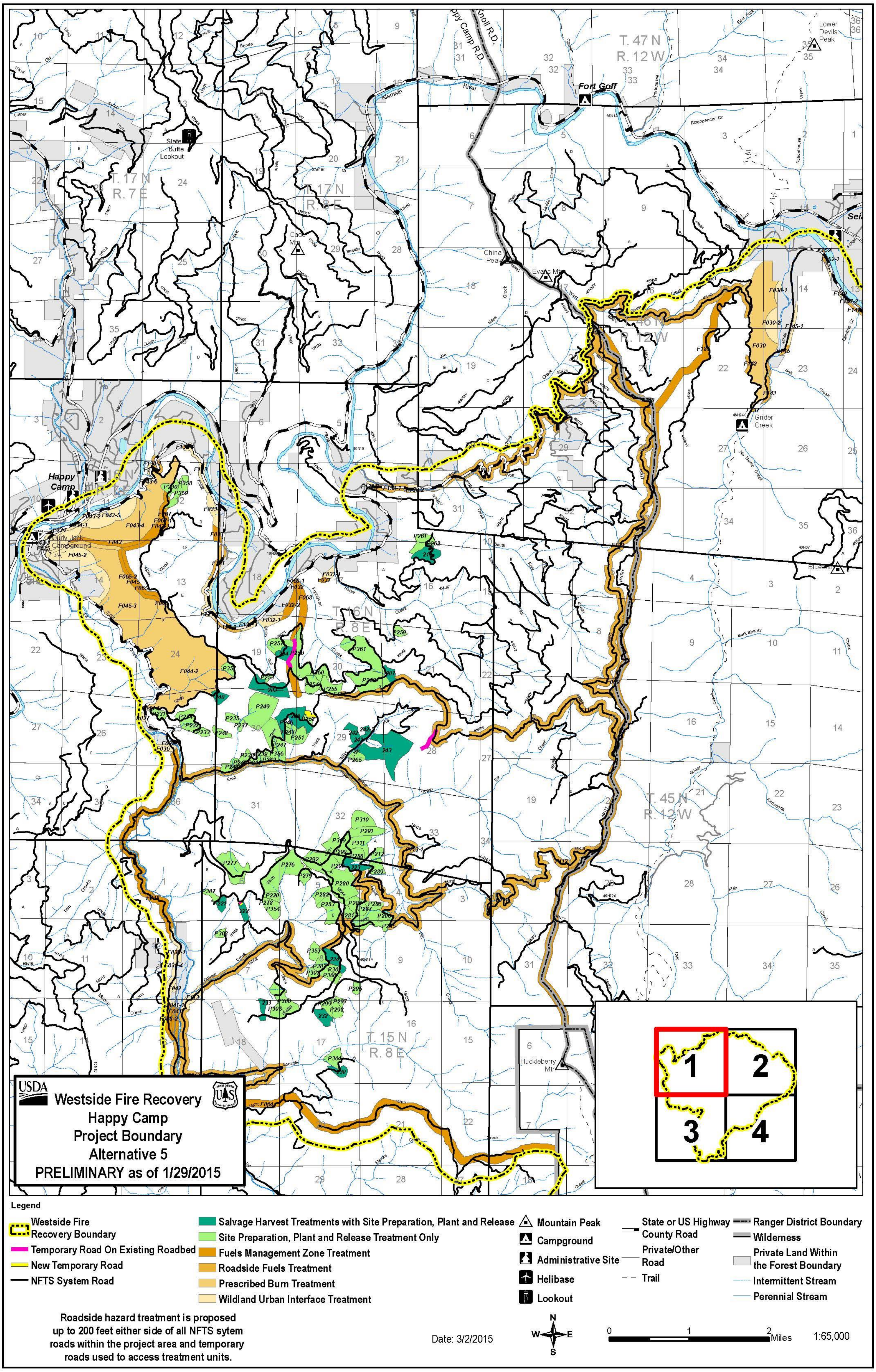

Map A-15: Alternative 5 – northwest section of the Happy Camp Complex

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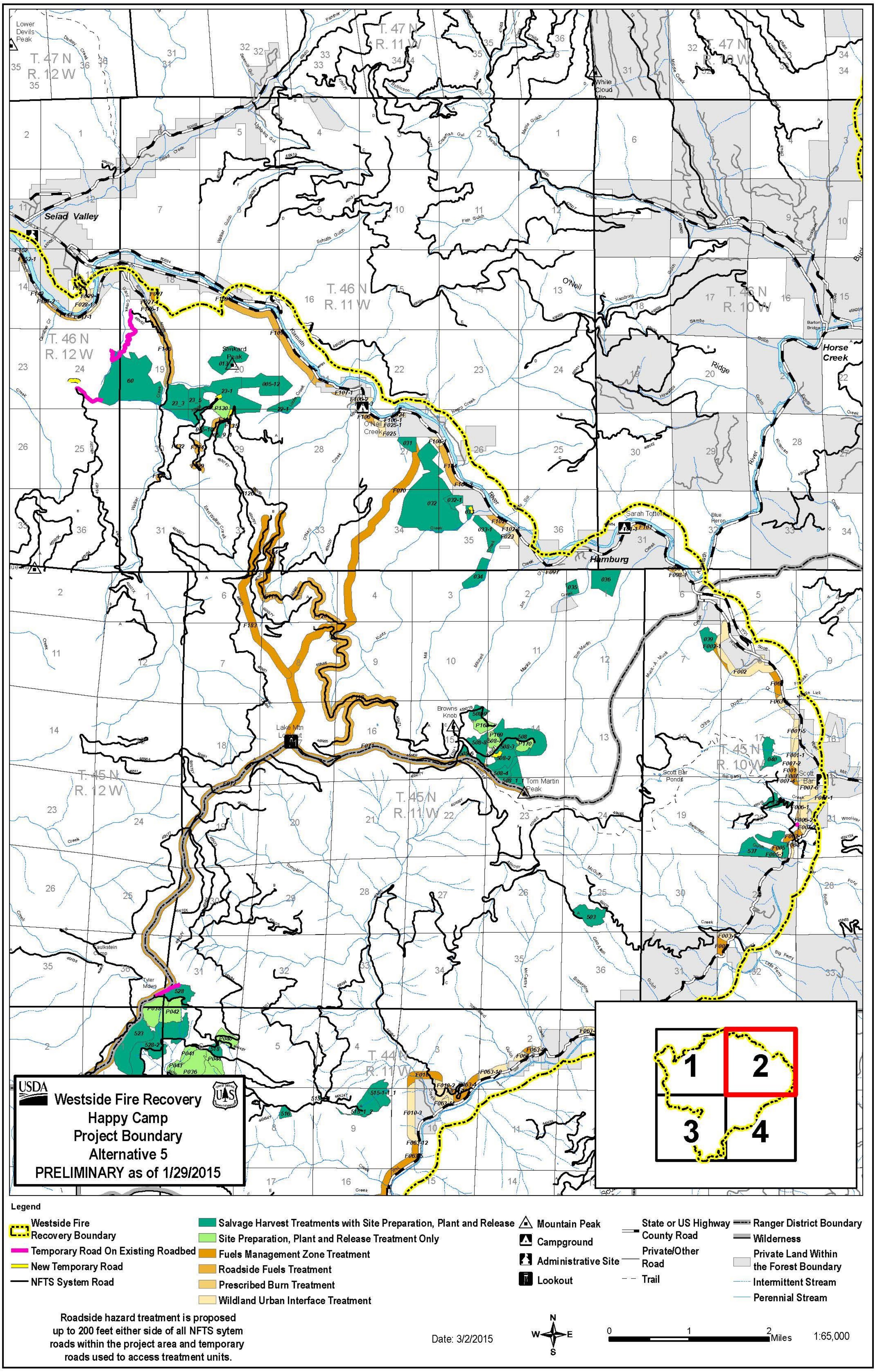

Map A-16: Alternative 5 – northeast section of the Happy Camp Complex

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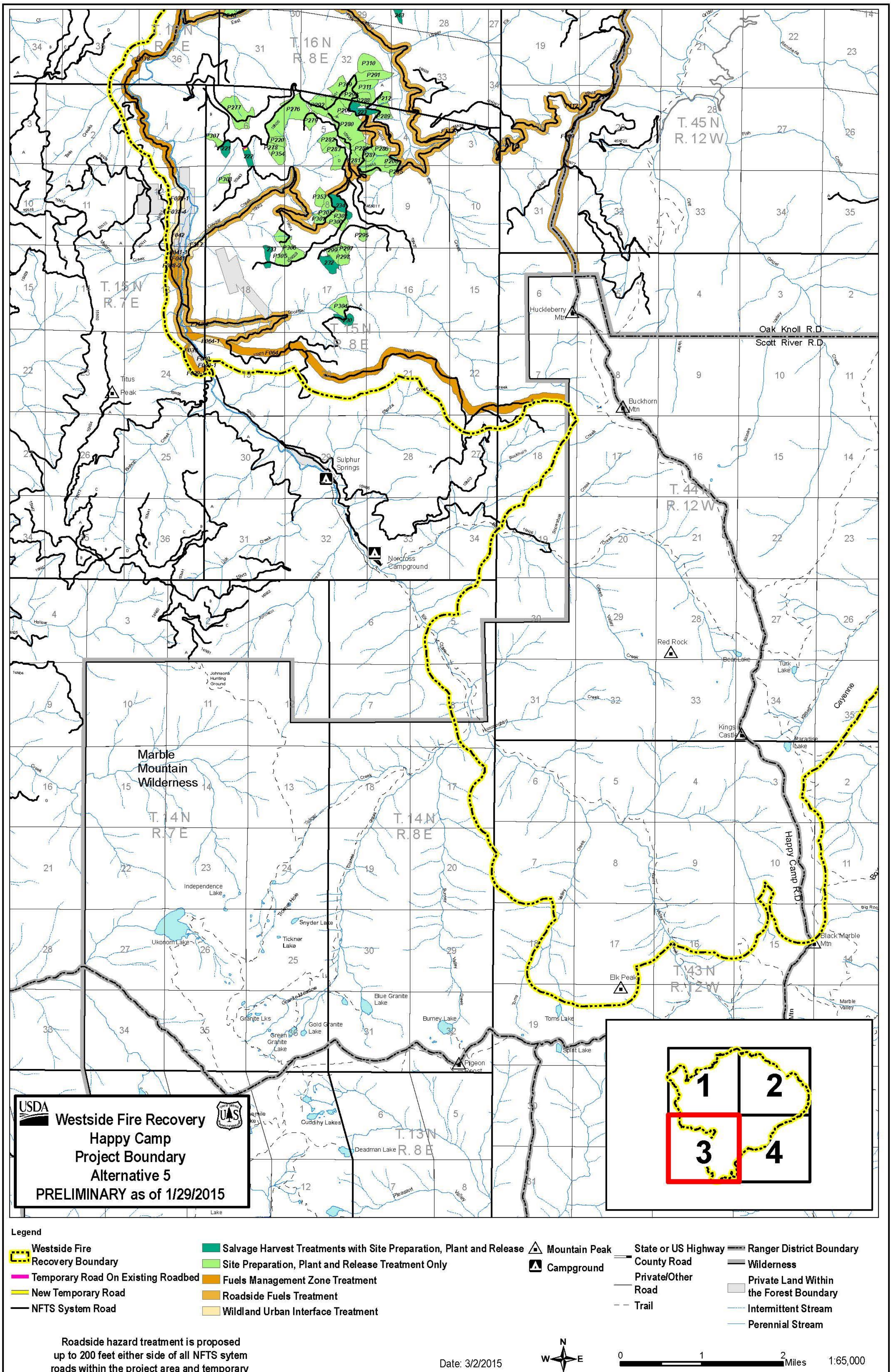

Map A-17: Alternative 5 – southwest section of the Happy Camp Complex

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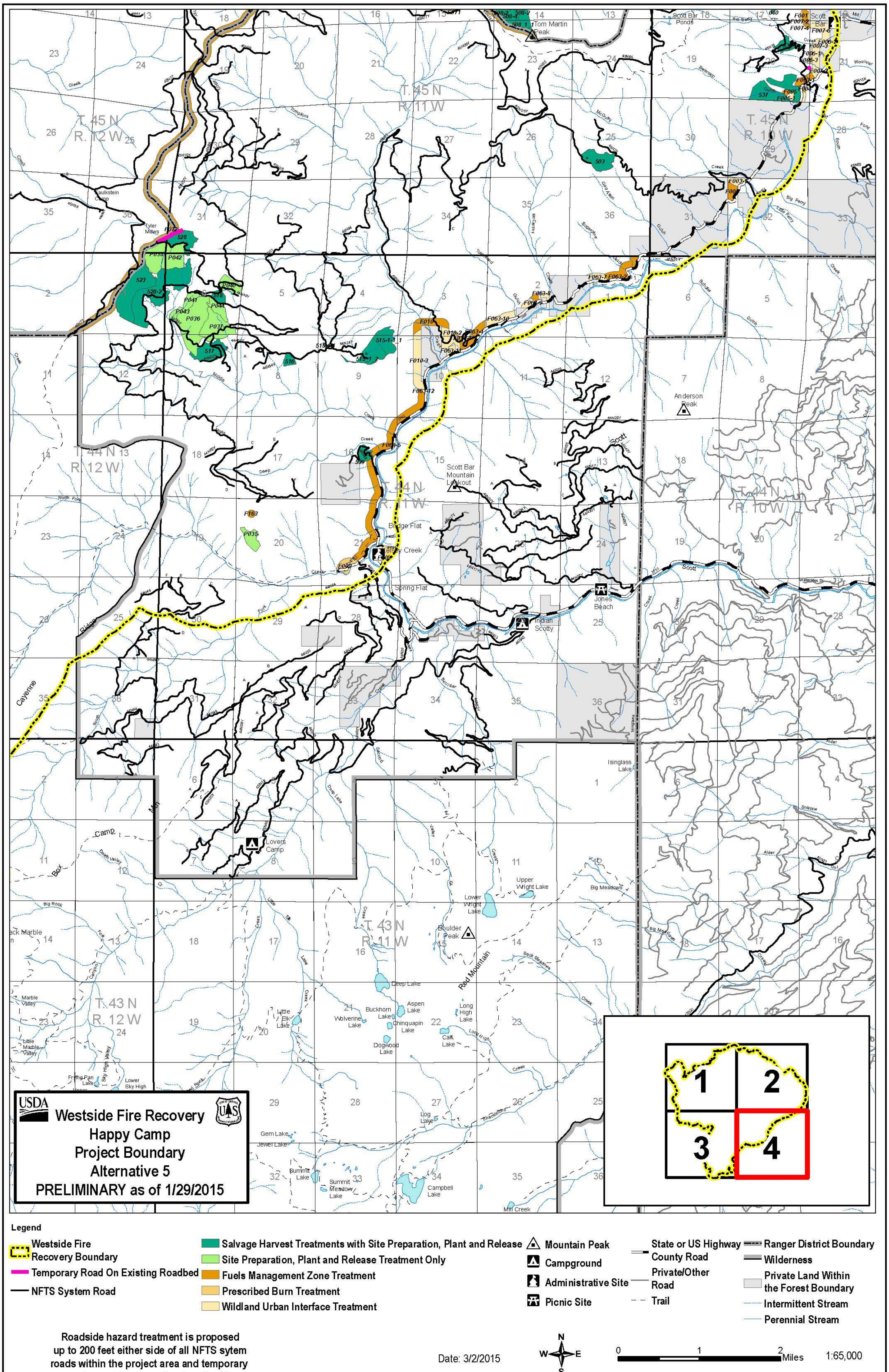

Map A-18: Alternative 5 – southeast section of the Happy Camp Complex

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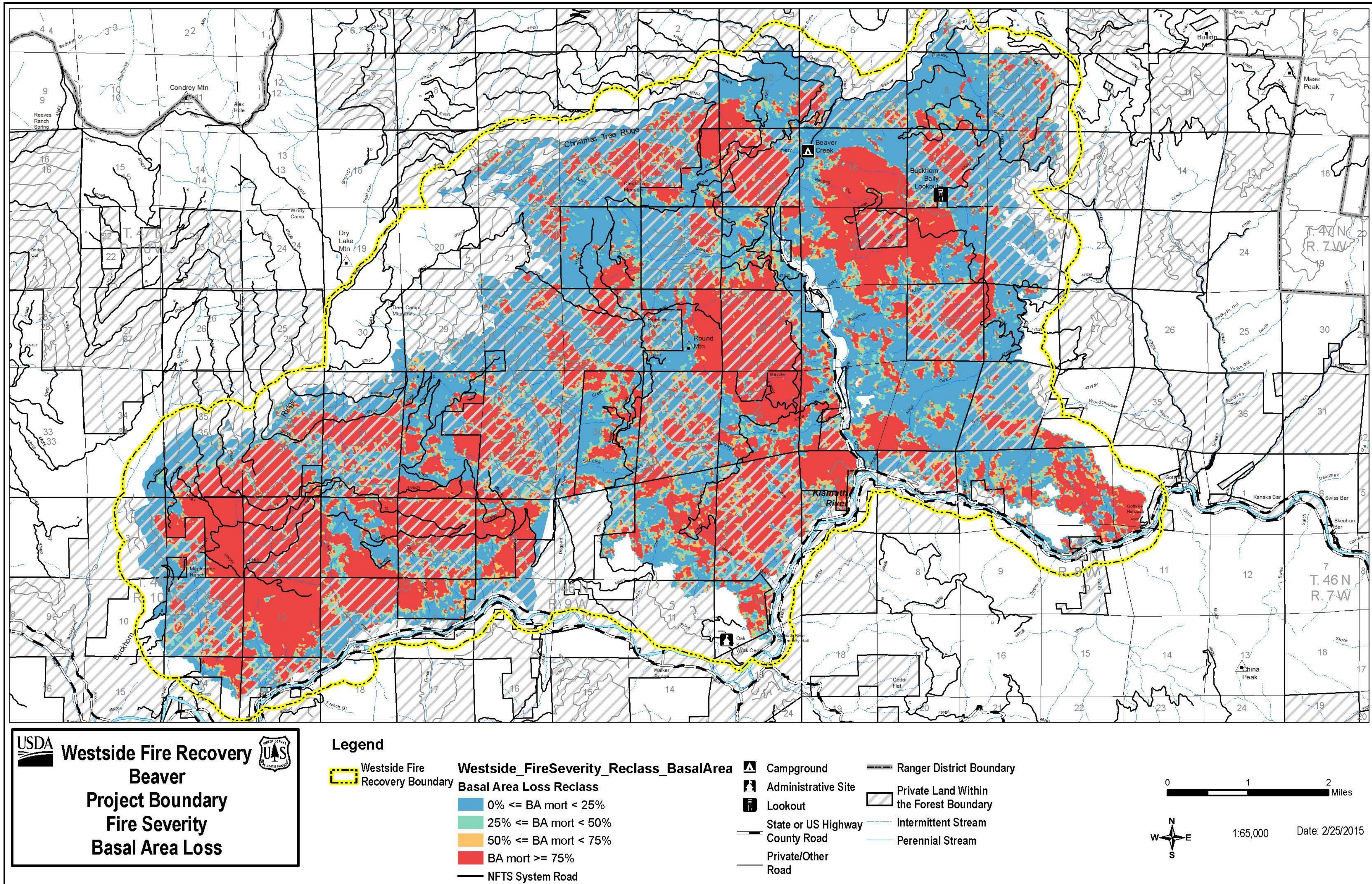

Map A-19: RAVG Map – Beaver Fire

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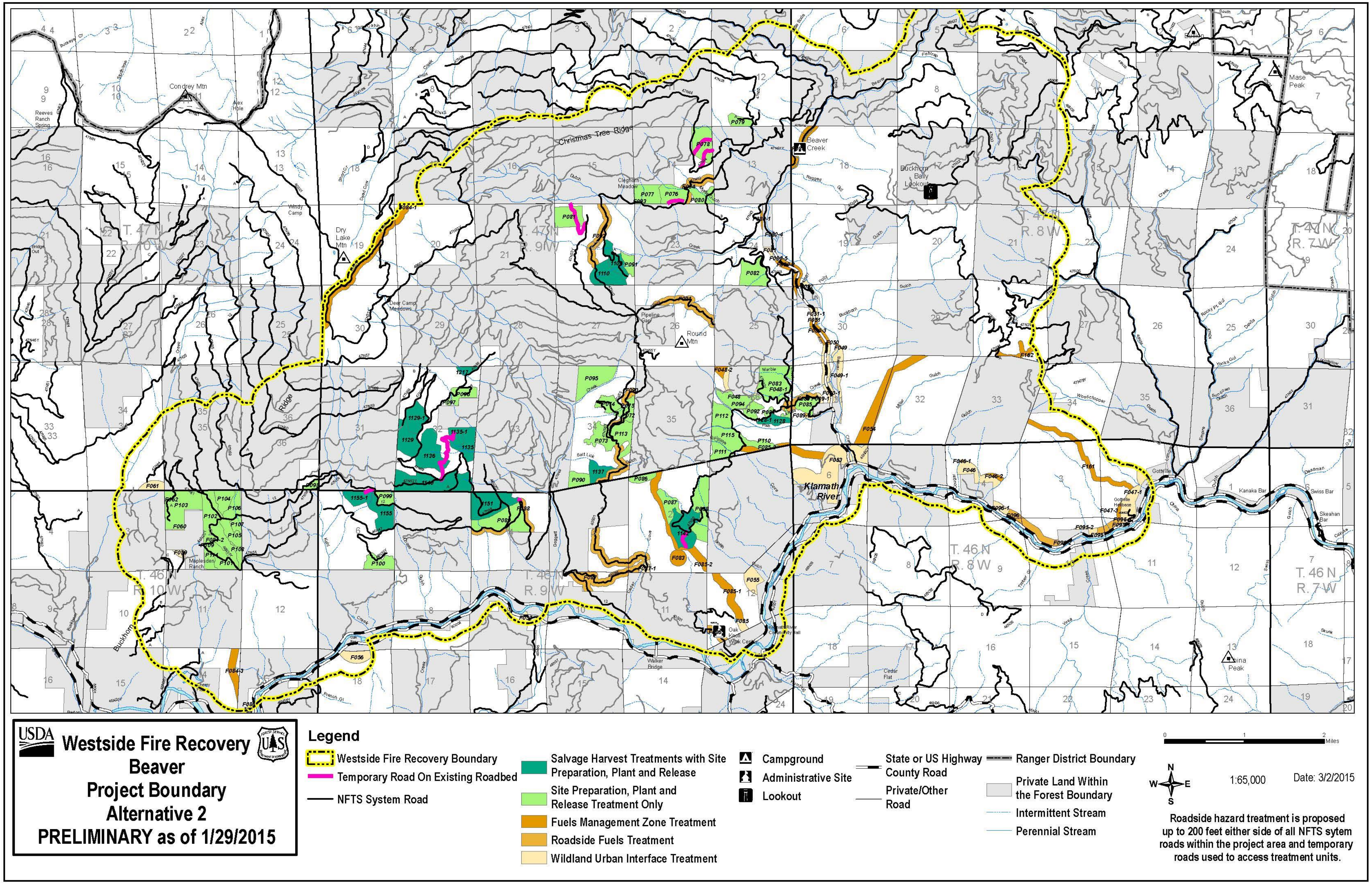

Map A-20: Alternative 2 – Beaver Fire

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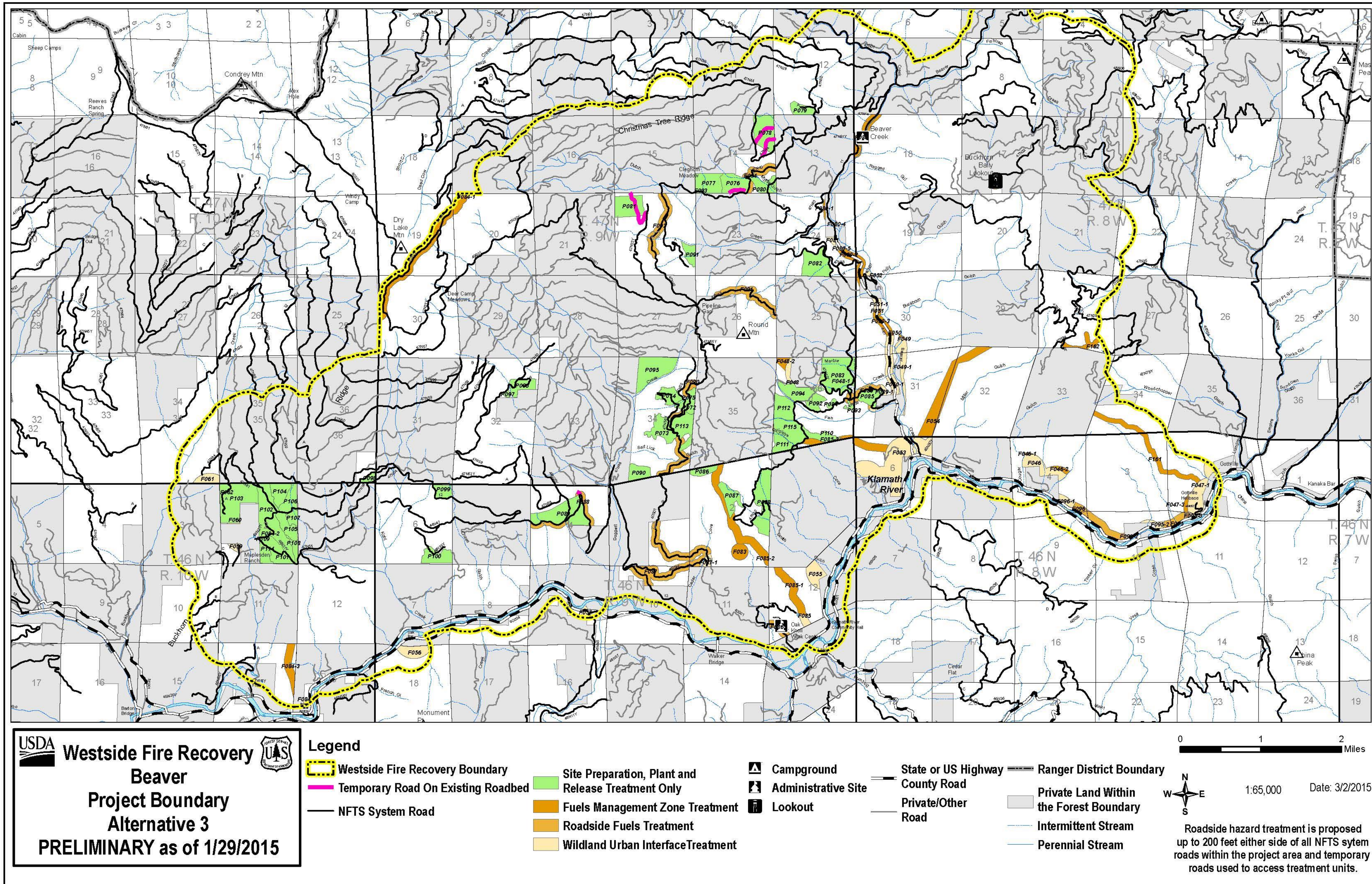

Map A-21: Alternative 3 – Beaver Fire

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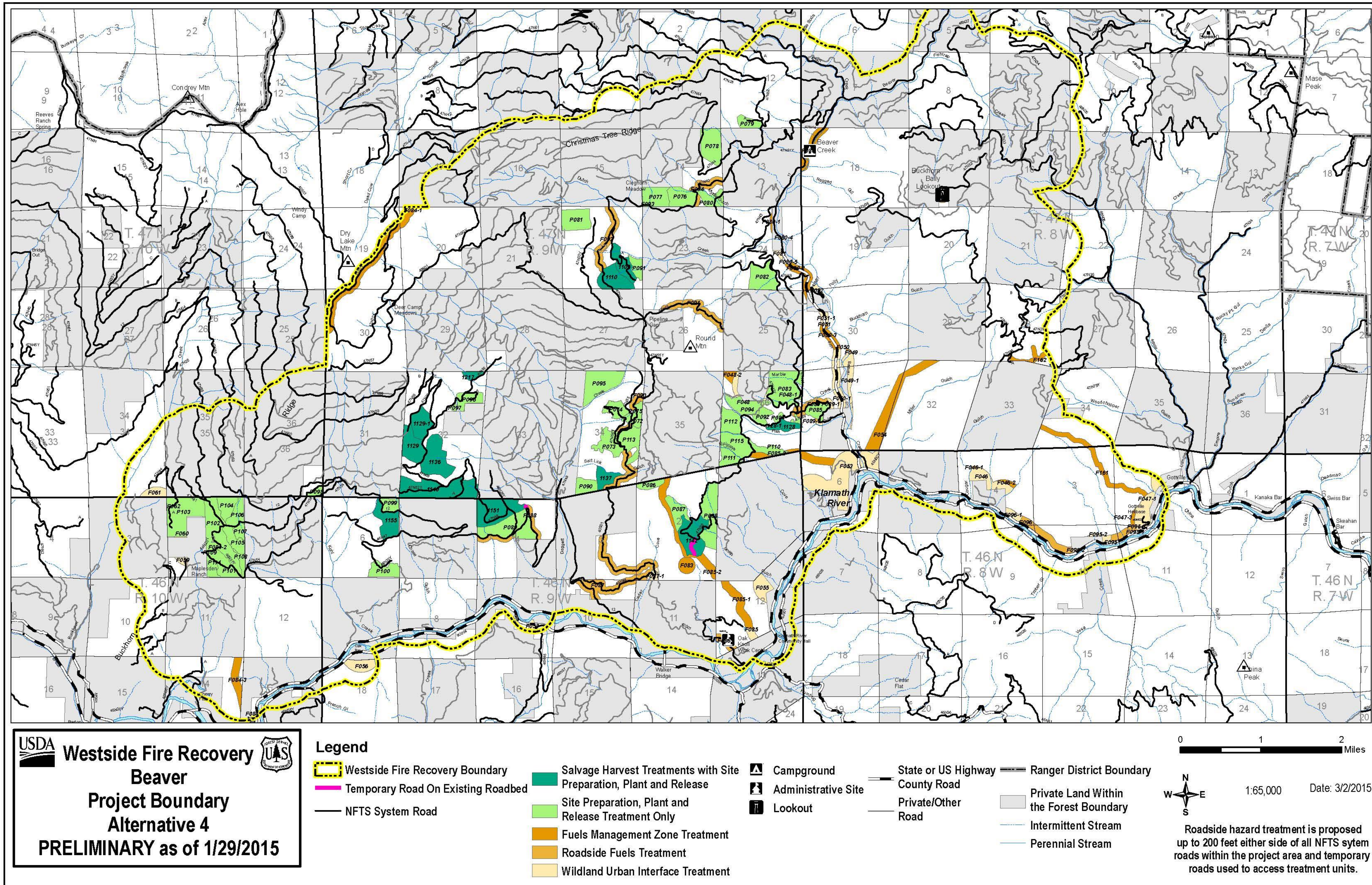

Map A-22: Alternative 4 – Beaver Fire

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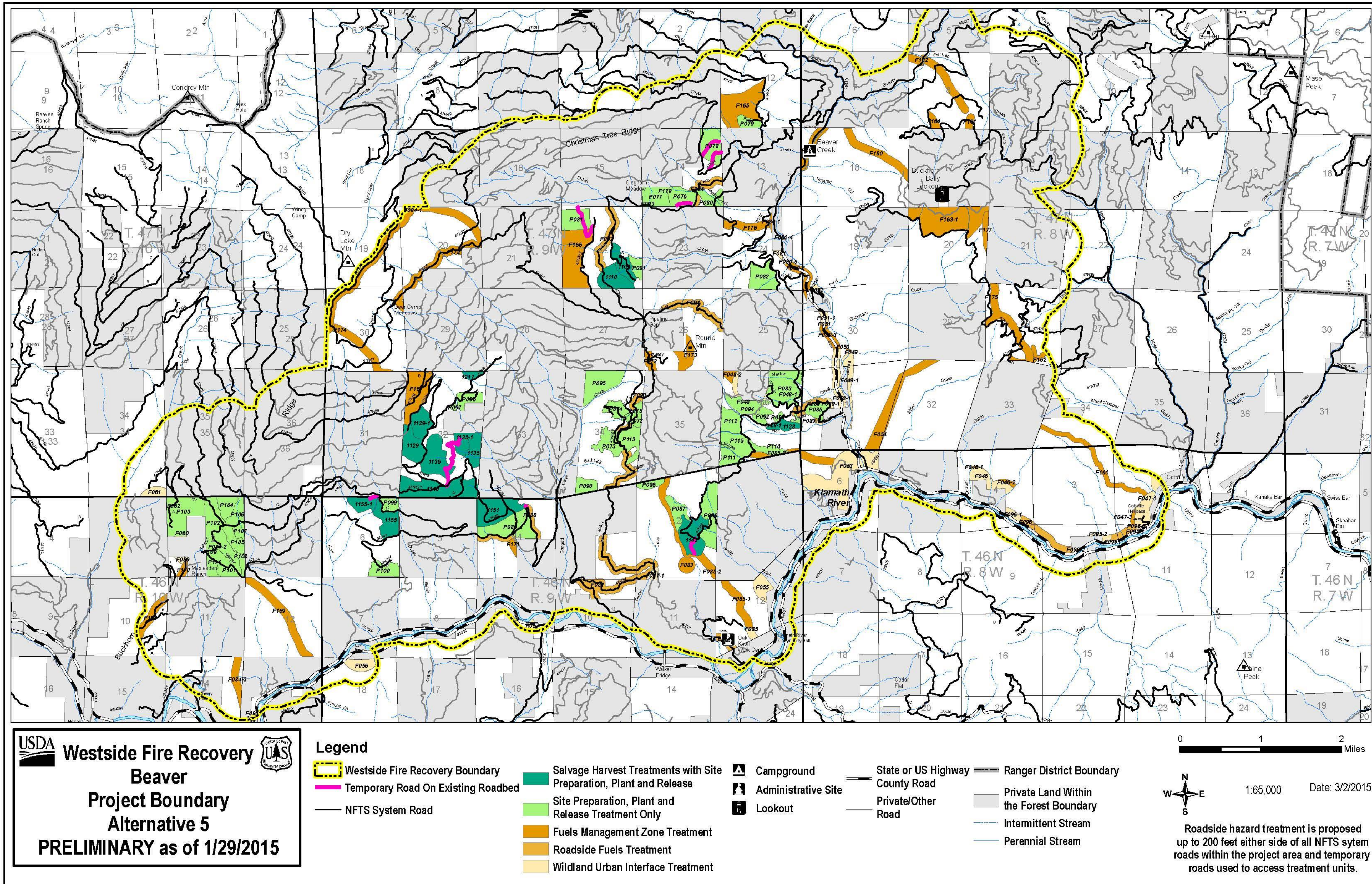

Map A-23: Alternative 5 – Beaver Fire

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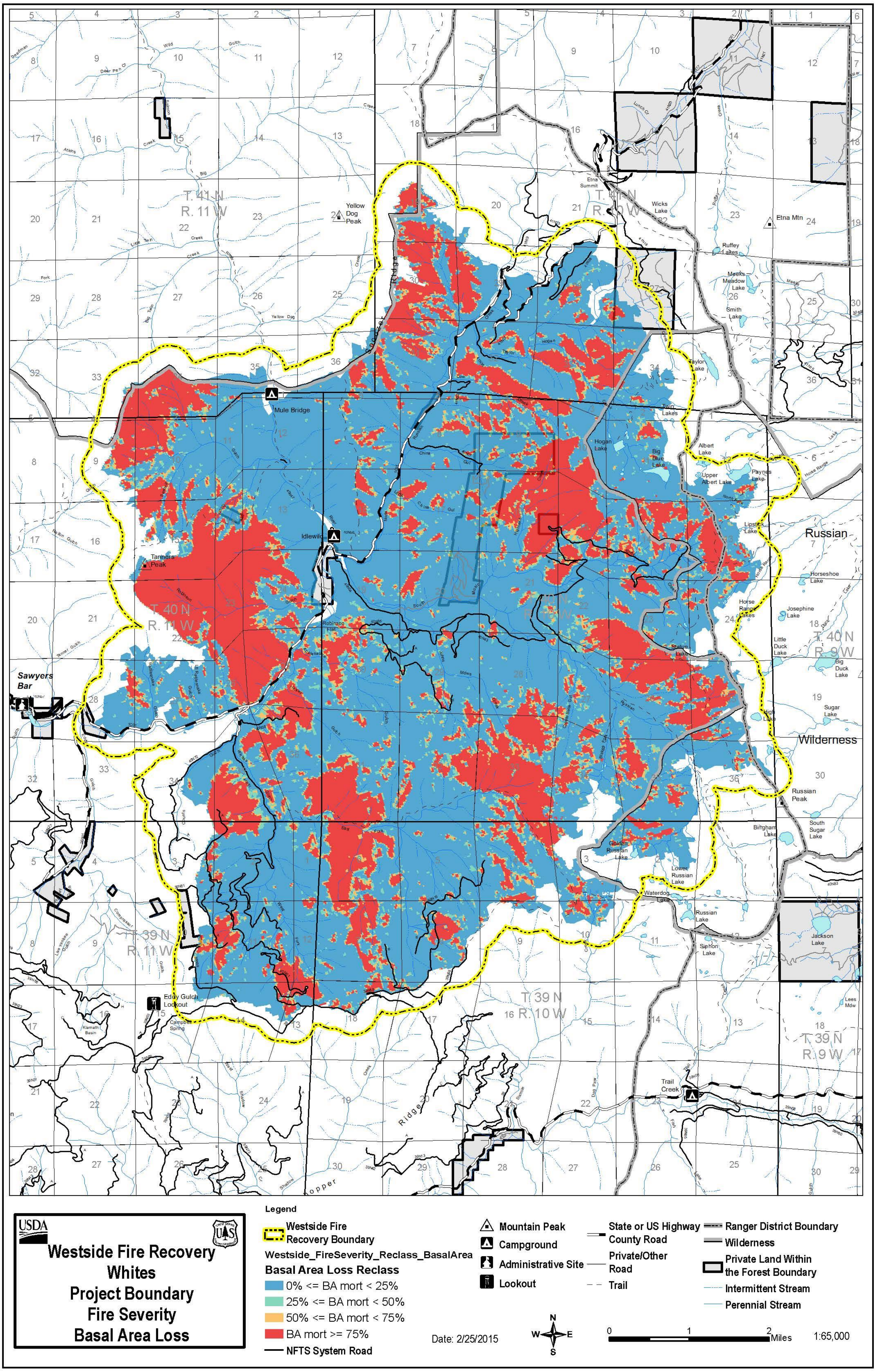

Map A-24: RAVG Map – Whites Fire

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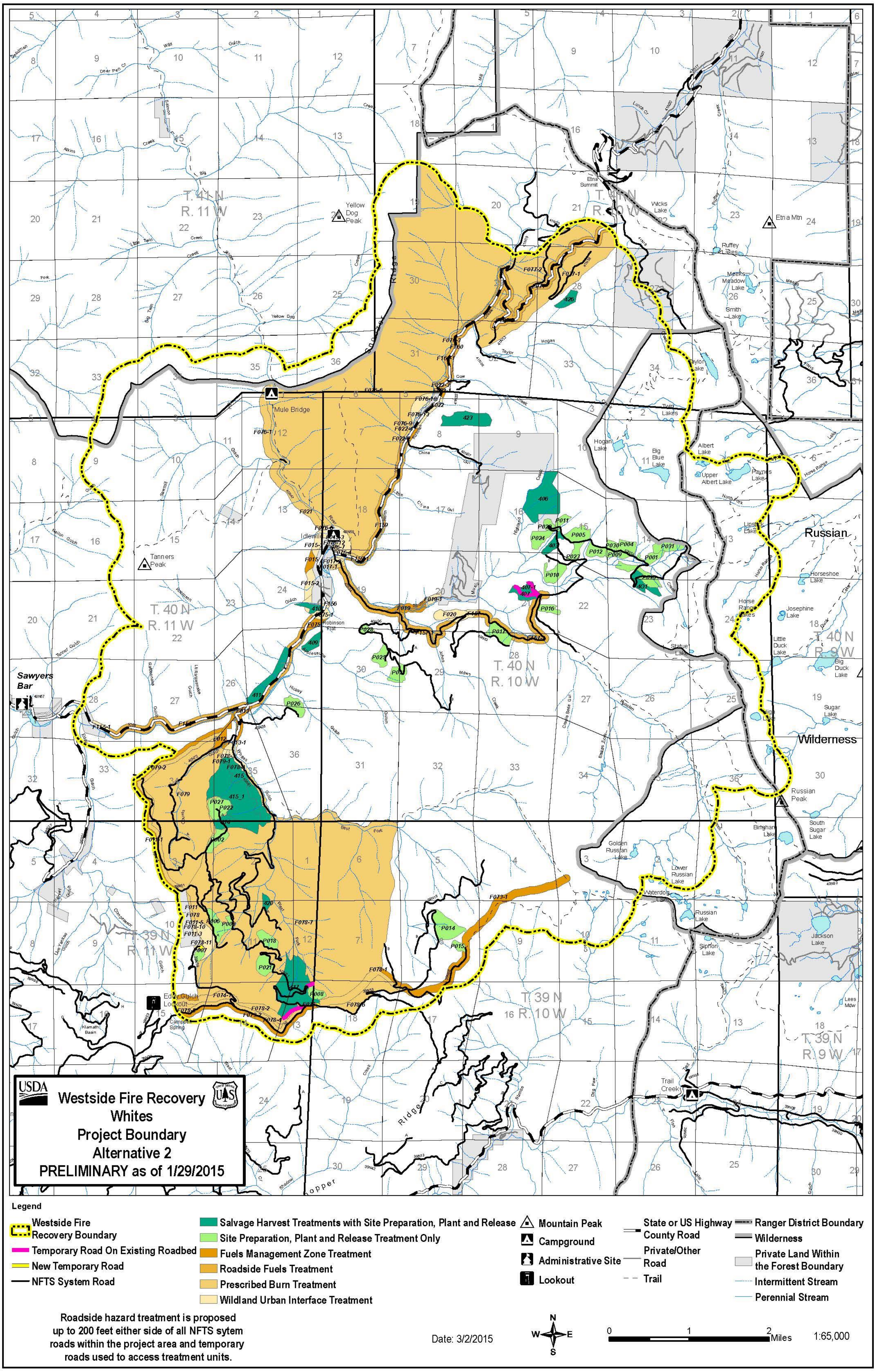

Map A-25: Alternative 2--Whites Fire

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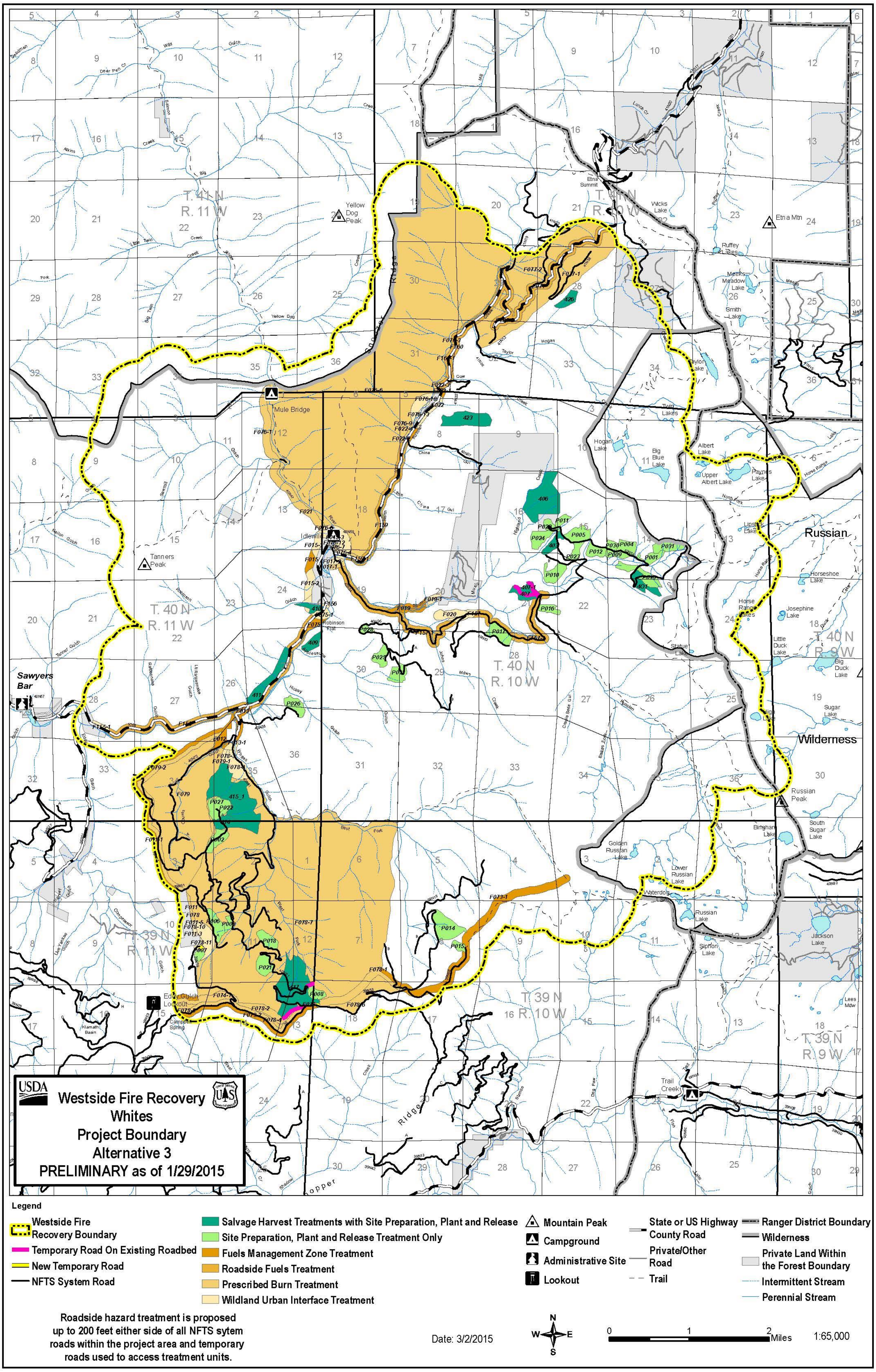

Map A-26: Alternative 3 – Whites Fire

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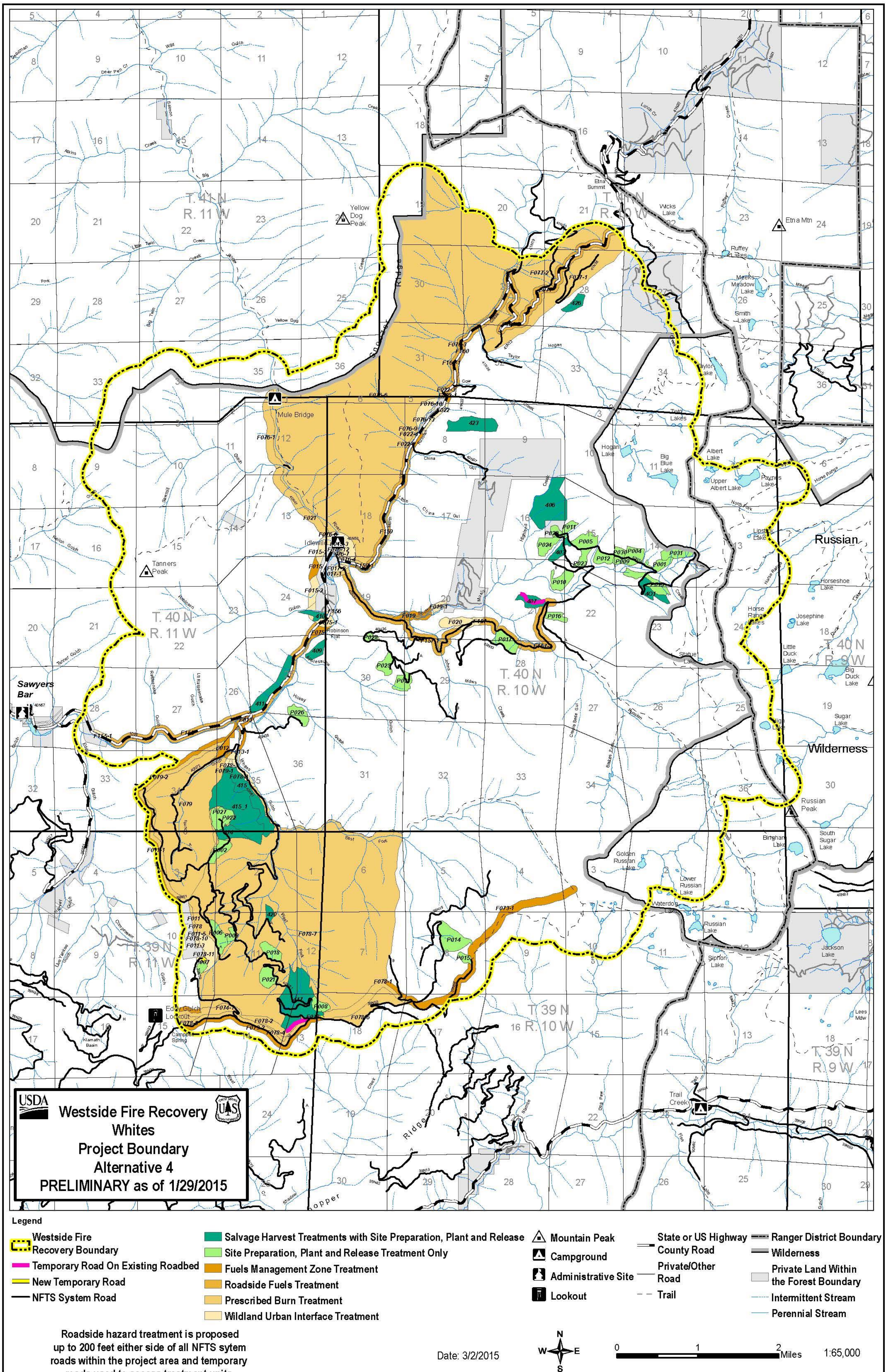

Map A-27: Alternative 4 – Whites Fire

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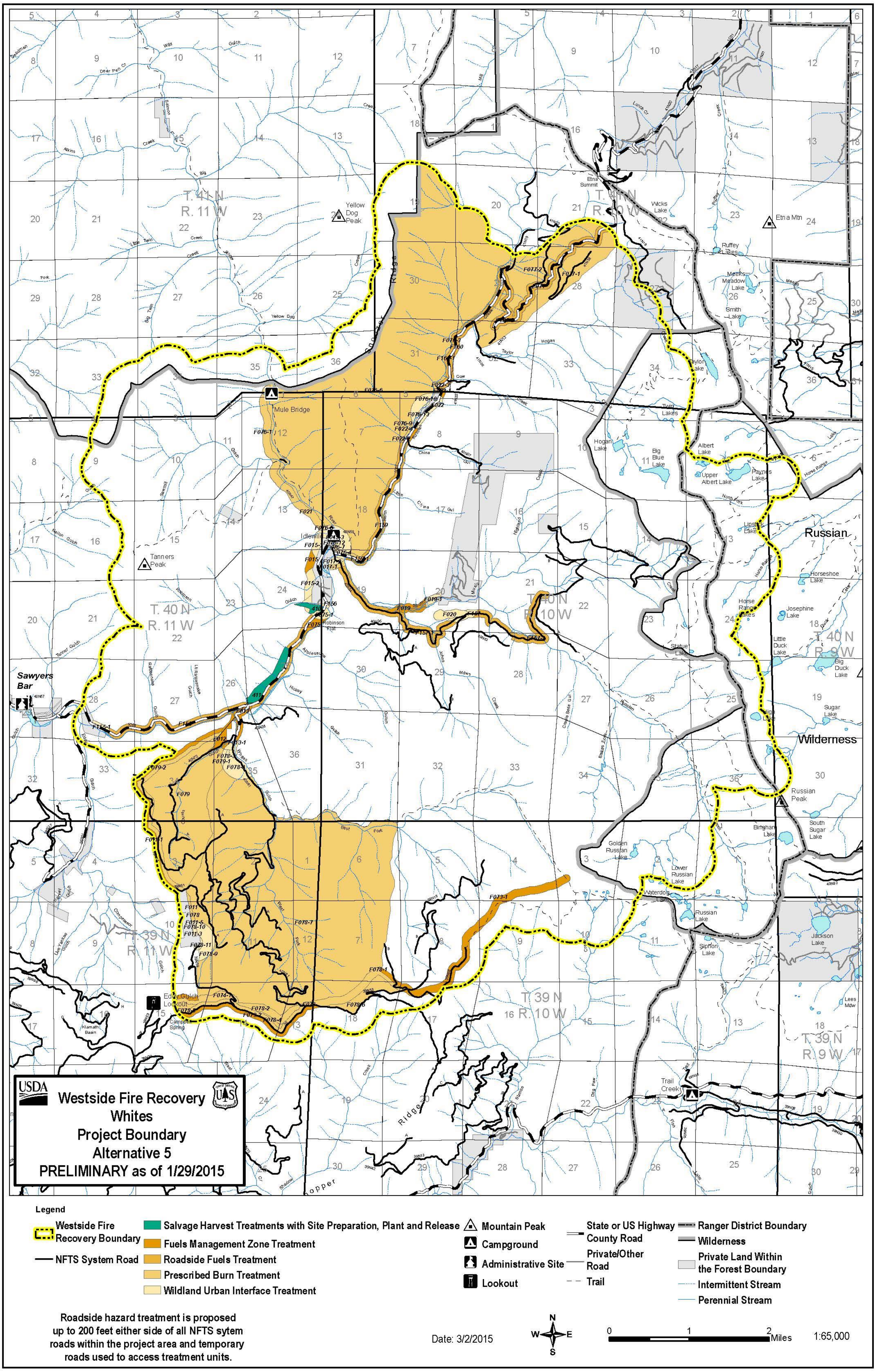

Map A-28: Alternative 5 – Whites Fire

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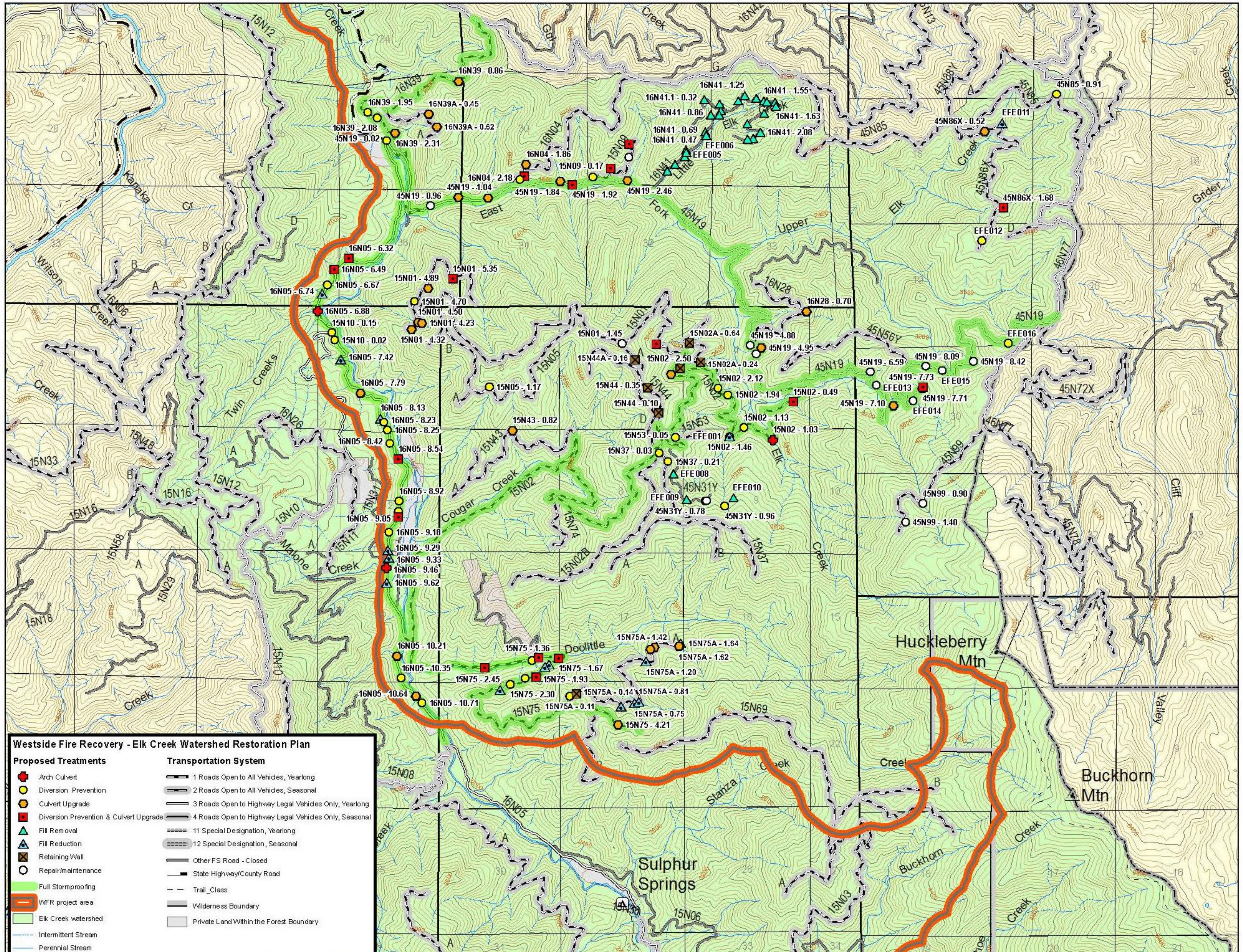

Map A-29: Legacy Map – Elk Creek Restoration

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Appendix B: Public Scoping Comments Disposition and Open House Record

The Forest Service received 749 unique comments by means of 98 unique letters, and 1,556 form letters. Four issues were determined to be relevant to alternative development or modification.

Methodology

The Forest Service provided the proposal for public review and comment for scoping from October 15 to November 15, 2014. Comments received before scoping were reviewed and considered during the development of the proposal and are not included in this disposition. Comments received after the end of the scoping period are being considered in the decision but not towards issue or alternative development.

Comments received during the scoping period were considered towards issue and alternative development. Comment documents were tracked upon receipt to assure all relevant comments were captured. All letters and attachments were logged in and scanned into an electronic file and made available in the project's public reading room for public review. Individual comments from within each comment document were identified and highlighted. Due to the amount of comments received, comments were categorized by subject area and like comments were grouped together into concern statements, as provided in table B-1 below.

Issues are defined as points of discussion, dispute, or debate about the environmental effects of proposed actions. Relevant issues were defined as being concerns about the directed or indirect effects of the implementing the proposed action. Relevant issues were resolved through alternative development. See chapter 1 for the issue statements and chapter 2 for alternatives resulting from concern statements that met the definition of an issue.

Other issues were not considered relevant for any of the following reasons:

- The issue was outside the scope of the purpose and need and is not related to the decision to be made.
- The issue was a procedural concern, which is already decided by law, regulation, policy, or direction (Forest Plan).
- The issue was a procedural concern, which is addressed through analysis.
- The issue is handled through project design.
- The issue is not supported by scientific or factual evidence.
- A general comment or question that did not meet the definition of an issue.

Some public comments included references and attachments of various articles and publications. References were filtered from further consideration if they were:

- cited but not provided by the commenter, including non-functioning hyperlinks;
- cited and provided but were not related to the comments from the commenter; or
- cited and provided but not a scientific study (e.g. opinion pieces).

References of scientific literature that were cited, provided, and tied to comments were reviewed by the appropriate interdisciplinary team member in order to determine whether or not the comment and reference were relevant to the actions being proposed and their potential effects. Literature was incorporated into analysis as appropriate. The attachments and the full review of references cited are available in the project record.

Results

In response to public scoping comment, the Forest Service developed four relevant issues, four new action alternatives analyzed in detail, and ten alternatives considered but eliminated from detailed study. See chapters 1 and 2 for details. Other issues were raised by the public that are being addressed by alternative 1 (no action), alternative 2 (the refined proposed action), and/or are being handled through responses to public comment (table B-1).

Table B-1: Concern statements and responses

Concerns	Concern Text	Response Text
1	There is a concern that salvage logging should be avoided in low to moderate fire severity areas and in areas where fires were ignited from below.	Criteria and rationale for determining the locations for proposed salvage harvest is clarified in chapter 2 under the description of the refined proposed action. Salvage harvest is not proposed in low fire severity areas, and is largely proposed in high severity area. Also see project design features, especially for wildlife, in chapter 2.
2	There is a concern that we will allow for the logging of trees that shouldn't be removed, especially green trees and large trees, and that this will result in the loss of a natural seed source and desertification in the long term.	None of the alternatives in this project propose green-tree removal. Green trees are defined as those with a 70% or better chance of surviving as discussed in chapter 2 of the DEIS. Some of the trees to be removed in all action alternatives include some green needles or leaves; however, the trees have a 70% or greater chance of dying and becoming part of the fuel accumulation on the ground in the short term. Criteria and rationale for determining the locations for proposed salvage harvest is clarified in chapter 2 under the description of the refined proposed action. Effects of logging on natural seed sources, and large and green trees are disclosed in chapter 3 of the EIS under the vegetation section.
3	There is a concern that salvage logging in burned areas will inhibit natural growth and recovery of plants and will negatively impact fragile post-fire soils.	Effects of logging on natural growth and recovery of plants, and post-fire soils, is disclosed in chapter 3 under the vegetation and soils sections.
5	There is a concern that salvage logging or planting within Inventoried Roadless Areas (IRA) fails to preserve Roadless qualities within the IRA.	No salvage logging is proposed in any IRA under any alternative. Effects of planting on Roadless characteristics within IRAs are disclosed in chapter 3 under the IRA section.
6	There are concerns that salvage logging, especially by helicopter, will result in too much activity fuel, higher risk of fire, and the removal of biological legacies.	The effects of salvage logging on fuel loading and fire risks are disclosed in chapter 3 of the EIS under the fuels section.
7	There are concerns that salvage logging on both private and federal lands, especially in the Beaver Fire area, would create unacceptable cumulative impacts.	Cumulative effects of salvage logging on private and federal lands are disclosed throughout chapter 3.
8	There is a concern that not enough road access will be provided to facilitate salvage efforts.	Road access for project implementation is discussed in chapter 2 under the proposed action and alternatives to the proposed action. Areas determined appropriate for salvage harvest are also discussed in chapter 2.
9	There is a concern that salvage logging and site preparation for planting should occur only on "matrix" lands and areas along existing roads.	Alternative 5, described in chapter 2, was developed in response to this relevant issue (chapter 1).

Concerns	Concern Text	Response Text
10	There is a concern that the salvage of trees, outside of what is required for public safety and the protection of infrastructure, especially at high elevations, is not necessary and is detrimental to the natural recovery process and the forest will recover more slowly than if left un-salvaged.	There are three relevant issues related to the disagreement about the effects of salvage harvest on resources (see chapter 1). The Forest Service developed three alternatives to the proposed action in response to this overarching concern. The no action also responds to this concern. Effects of the salvage of trees on the likelihood and speed of recovery of the forest will be disclosed in chapter 3.
11	There is a concern that Westside Fire Recovery Project efforts are not designed in a way that will incorporate cultural burning practices, promote the preservation of culturally significant plants and encourage the restoration of a natural fire regime to the project area.	Consultation with the Karuk tribe is ongoing and the proposed action has been refined since scoping to incorporate the concept of cultural burning as a project design feature (chapter 2 of the EIS). Effects of alternatives on the preservation of culturally significant plants and restoration of a natural fire regime will be disclosed in chapter 3 in the botany, heritage, and fuels sections.
12	There is a concern that there are not enough fuel treatments, including fuel breaks proposed in this project, especially around the wildland urban interface and private land but also along roadsides, along strategic ridgelines and around infrastructure.	In response to public scoping comments, fuels treatments have been added to the refined proposed action (alternative 2) and a new alternative (alternative 5) has been developed to address additional fuels treatments around private property in the Beaver Fire area. All alternatives in the EIS specify the number, size and location of the fuels treatments being proposed, including strategically placed fuel breaks and other hazardous fuels reduction treatments to address the need for safe conditions and access for fire suppression for firefighters and communities and enclaves within the wildland urban interface. See chapter two and appendix A (maps) for a description of fuels treatments by alternative. See chapter 3 under fuels for a discussion of the effects of the proposed treatments.
13	There is a concern that the forest is not facilitating the restoration of historic fire adapted communities or trying to restore a natural fire regime.	The purpose and need has been clarified in response to scoping concerns (chapter 1). The Forest Service recognizes the need for restored and fire-resilient forested ecosystems for this project. See chapter 2 for the proposed actions, including salvage harvest and hazardous fuels treatments that address this need. Effects of alternatives on the restoration of fire-adapted communities and a natural fire regime are disclosed in chapter 3 under the fuels section.
14	There is a concern that fire killed fuels and activity fuels pose a fire risk, especially for green trees, if not treated.	Effects of alternatives on fire risk is disclosed in chapter 3, primarily under fuels but also see other resources, including vegetation and wildlife.
15	There is a concern that the forest is in need of a new and improved safety/fire management plan.	The development of a new and improved safety/fire management plan is beyond the scope of this project. However, the effects of alternatives on safety and future fire suppression efforts are disclosed in the EIS.
16	There is a concern that the Forest will not salvage enough trees to take full advantage of the economic opportunity available.	The proposed action was refined to include more salvage units, which was based upon field-verified information and information provided by the public during scoping comments. The effects of salvage harvest and roadside hazard treatments on economic opportunities are disclosed in chapter 3 the EIS under the social-economic section.

Concerns	Concern Text	Response Text
17	There is a concern that Limited Operating Periods will limit economic opportunity.	The limiting operating periods included as project design features in chapter 2. The Forest Service recognizes that limiting operating periods may affect economics, but they are required in order to meet other legal requirements, including Forest Plan direction.
18	There is a concern that the forest will not allow public access to the fire area for free firewood.	In response to public comments, alternative 2 of the proposed action addresses this concern (chapter 2). Following roadside hazard treatments, non-merchantable trees will be cut and left when it is not along a strategic road for fuel treatments. Per agency policy already in place, the public may obtain a fuelwood permit to remove felled trees for firewood in accordance with permit requirements. The agency anticipates that the local public will remove firewood along roadways, especially near communities.
19	There is a concern that not enough hazard trees will be removed from roadsides.	Hazard trees along all county, state, and Forest roads (maintenance levels 1-5) will have all identified hazard trees identified and felled, including burned and unburned. Hazard trees will also be removed, where it meets Forest Plan direction and other legal requirements. Hazards trees will be felled and left in certain places such as riparian reserves. For a detailed description of what is proposed, the description of the proposed action and project design features in chapter 2.
20	There are concerns that salvage logging or planting in a Late Successional Reserve (LSR) will cause us to fail to meet the goals to protect and enhance conditions of LSRs, old growth ecosystems and habitat for late-successional associated species.	The proposed action, within LSRs, is designed to protect and promote LSR habitat. In response to public comments and relevant issues 1 and 3 (chapter 1), alternatives 3 and 5 were developed that have reduced treatments in LSRs compared to the proposed action. Alternative 3 addresses concerns related to the effects of salvage harvest on late successional and northern spotted owl habitat. Alternative 5 eliminates salvage harvest and planting from LSRs. Effects of the varying amounts of salvage harvest and planting by alternatives on LSR is disclosed in chapter under the wildlife section.
21	There is a concern that salvage logging will harm wildlife and wildlife habitat, especially for snag-associated species.	Effects of alternatives on wildlife and habitat, including the snag associated species, are disclosed in chapter 3 under the wildlife section.
22	There is a concern that the guidelines used for determination of trees to be salvaged are not restrictive enough and will result in the loss of biological legacies crucial to wildlife.	The Forest Service has been consulting with the U.S. Fish and Wildlife Service throughout the development of the proposed action and alternatives to the proposed action. The proposed action was designed to protect and promote LSR habitat and to meet the recovery plan for the northern spotted owl. By meeting these requirements, the project design provides for legacy components and other wildlife habitat needs. See the project design features in chapter 2 for specific wildlife design criteria to retain legacy components. In response to scoping comments, the Forest Service recognized this as a relevant issue (chapter 1) and subsequently developed alternative 3 (chapter 2). Also see the wildlife section in chapter 3 for a discussion of the effects of salvage harvest on wildlife by alternative.

Concerns	Concern Text	Response Text
23	There is a concern that treatment in riparian areas will cause negative impacts to the watershed and specific activities to avoid this are recommended.	As scoped, no salvage harvest is proposed within riparian reserves. However, other treatments, including site preparation and planting are proposed within riparian reserves, as developed by the interdisciplinary team for the benefit of riparian reserves. Roadside hazard treatments are proposed within riparian reserves to address safety and access needs; however, project design features are incorporated into the proposed action and its alternatives, including leaving felled hazard trees within riparian reserves for large woody debris recruitment. See chapter 2 for a detailed description of project design features to mitigate effects of proposed treatments on riparian reserves. As a result of scoping, the Forest Service recognized relevant issues no. 2 and 3 related to this comment. In response to the relevant issues from scoping, the Forest Service developed alternatives 3, 4, and 5. In response to scoping comments, the Forest Service also refined the proposed action by modifying and adding project design features to the project. See chapter 2 for a description of the proposed action, its alternatives, and associated project design features. Effects of treatments in riparian areas in the refined proposed action are disclosed in the DEIS. Project design features have been incorporated into the action alternatives to mitigate the project's effects on watershed resources.
24	There is a concern that the construction of new temporary or permanent roads as a part of this project will create unnecessary negative impacts on watersheds, and road maintenance and improvement actions will not be part of this project.	The Forest Service incorporated concern into relevant issue no. 2 (see chapter 1) and developed alternative 4, which responds to this issue. See chapter 2 for a description of alternative 4. Project design features have been developed and modified since scoping to mitigate negative effects on watershed as a result of temporary road access (chapter 2). Proposed road access needed for implementation, including road maintenance, is described in chapter 2 under each action alternative. Additionally, legacy site treatments, including road improvement actions, are described under the proposed action and apply to all action alternatives (chapter 2). Effects of road access related action on watershed conditions are described in the hydrology section of chapter 3.
25	There are concerns that salvage logging or fuels treatment activities may result in erosion, landslides, and sediment delivery to riparian areas or may result in the destruction of flora that provides watershed protection.	In response to concerns about salvage harvest and watershed impacts (relevant issue no. 2 in chapter 1), the Forest Service developed alternative 4. Project design features have been developed and modified since scoping to mitigate negative effects on watershed and botany resources as a result of salvage harvest or fuels treatments (chapter 2). Effects of salvage harvest and fuels treatments on flora and on erosion, landslide, and sediment delivery to riparian areas are described in chapter 3 under the botany, vegetation, soils, geology, and hydrology sections.
26	There is a concern that we are not including more vegetation cover in our stocking estimates.	Action alternatives (2 through 5) propose replanting with a mix of conifer species suitable to the area to increase vegetative diversity, and encourage the natural regeneration of hardwoods where they exist, as specified in Chapter 2. Types of vegetation to be included in stocking estimates vary by the objectives of each unit and include hardwoods where they exist, as described under planting in the proposed action description in chapter 2.
27	There is a concern that planting, especially conifer-centric planting, within low or moderate severity burn sites will increase the likelihood of catastrophic wildfire and is unnecessary for forest recovery because a natural seed source is still available.	The criteria used to determine areas proposed for planting and how areas is clarified under the refined proposed action in chapter 2. The effects of such planting on the likelihood of catastrophic wildfire are addressed in chapter 3 under the fuels section. Concerns about planting were also captured under relevant issue 3 (chapter 1); the Forest Service developed alternative 5 with less proposed planting in response to this issue.

Concerns	Concern Text	Response Text
28	There is a concern that plantings and fuels treatments are not strategically designed for future fire management or for planted seedling success.	The criteria used to determine areas proposed for planting and how areas is clarified under the refined proposed action in chapter 2. The effects of such planting on planting success and fire management are addressed in chapter 3 under the vegetation and fuels section.
29	There is a concern that logging trucks “Jake brakes” will create a noise disturbance to certain homeowners along their route.	A project design feature was added to the refined proposed action and its alternatives in response to this concern near Walker Bridge (see chapter 2). Implementation direction will address noise disturbance to homeowners from “Jake brakes”.
30	There is a concern that the forest is planting conifers where they were not historically established or with wide-enough spacing, especially in LSRs.	The criteria used to determine areas proposed for planting and how areas is clarified under the refined proposed action in chapter 2. No planting is proposed where conifers were not historically found. Effects of planting on LSR habitat is disclosed in chapter 3 under the wildlife section.
31	There is a concern that salvage logging along a Scenic River will have negative impacts on its functionality and viewshed.	Forest Plan MA12-18 directs that “A wide range of silvicultural treatments may be used to meet Scenic River objectives.” Forest Plan direction for Scenic Rivers and its viewsheds is being met with the proposed action and its alternatives. Effects of salvage logging along Scenic Rivers on functionality and viewsheds are disclosed in chapter 3 under the scenery section.
32	There is a concern that the scope of the Westside Fire Recovery Project is too large.	The responsible official determines the scope of the project. The scope of the project was based upon the disturbance footprint of the 2014 fires. The project boundaries were extended slightly beyond the fire perimeter in order to incorporate fuels reduction treatments within 1/4 mile of private property structures and strategic fuel breaks for the local communities. The scope of the project also includes the effects of the proposed action and its alternatives, which is disclosed in the chapter 3.

Concerns	Concern Text	Response Text
33	There is a concern that restoring recreational features is not a part of this recovery project.	Beyond addressing hazard trees, as appropriate, the restoration of recreational features is outside the scope of the project. Fuels treatments are proposed adjacent to some recreational features in order to address needs from a hazardous fuels perspective. Both Grider Creek and Idlewild Campgrounds will reopen on May 16, 2015 upon termination of Forest Order #14-05-761; this will allow for an increase in use at these sites. Recreational features affected by the fires were reviewed and addressed during BAER activities, including the bridge replacements (Grider 2 and 3) for the Pacific Crest Trail. Special funding will be sought for recreation facilities damaged from the fires and trail signs will be replaced. As downed trees fall across the Forest trails, they will be cut to open up the trail during normal trail maintenance activities. Individual hazard trees will be removed at developed recreation sites as needed. Such treatments are considered maintenance of existing facilities and, when proposed, would likely be categorically excluded from documentation in NEPA pursuant 36 CFR 220.6(d)(3) or (4).
34	There is a concern that the specifications/project design features approved for the project will not end up on the stand prescription cards.	Following decision, applicable project specifications and project design features of the decision will be implemented. Appropriate means, including stand prescription cards, will be used.
35	There is a concern that an Emergency Situation Determination or Alternative Arrangements will not allow adequate time for analysis or provide for sufficient public involvement opportunities.	The Forest is applying for an emergency situation determination that may be approved by the Chief of the Forest Service. If approved, the emergency situation determination would result the FEIS and ROD being released at the same time, eliminating the requirement of an objection period, pursuant to 36 CFR 218.21. The Forest Service is also seeking alternative arrangements through the Council on Environmental Quality pursuant to 40 CFR 1506.11. If the alternative arrangements being sought are approved, the DEIS comment period would be reduced from 45 days to 30 days, the 90-day wait period between the release of the DEIS and FEIS would be eliminated, and FEIS and ROD would be released at the same time.

Concerns	Concern Text	Response Text
36	There is a concern that, without an Emergency Situation Determination or Alternative Arrangements, the forest will miss the opportunity to maximize profits from salvage.	In response to this public scoping concern and in order to meet the project's purpose and need, the Forest is seeking is seeking emergency situation determination (36 CFR 218.21), and the Forest Service is seeking alternative arrangements with the Council on Environmental Quality (40 CFR 1506.11).
37	Comments received that indicate general support for the project as proposed.	Comments will be considered by the responsible official when making a decision.
38	Comments received that provide general information, including literature references.	Available, relevant scientific literature was considered in the EIS per the methodology in this appendix. See table B-2 for results of the literature review.
39	Comments received that are beyond the scope of the project.	Some comments made were beyond the scope of this project but will be considered by the Forest in other projects or plans, as appropriate.
40	Comments received that showed concern about trust or credibility issues.	Although these comments are not directly related to the proposed action, efforts will be made to establish trust and credibility through public engagement efforts and implementation of the project and other projects.
41	Comments received that suggest a new complex alternative or a combination of things.	Suggested alternatives were either considered as a whole or parts and were incorporated into as appropriate. See the action alternatives and the alternatives considered but eliminated from detailed study in chapter 2.
42	Comments received that requested consultation, coordination, and continued involvement.	Continued consultation and coordination will be fostered through the development and implementation of the proposed project.
43	Comments received that identify laws, regulations and policies pertinent to the project.	The project will comply with law, regulation, policy and the Forest Plan.
44	Comments received that suggest something already addressed in a PDF or alternative or something that will be addressed in analysis.	This is a procedural concern. See chapter 2 for a description of the proposed action, including project design features. See chapter 3 for analysis of effects of proposed activities on relevant resources.
45	Concerns with the effects of the proposed action as scoped on air quality.	Effects of the refined proposed action and alternatives on air quality are disclosed in chapter 3 under air quality. Smoke Management Plans intended to incorporate best available control techniques for prescribed burning will be developed and implemented per the State Implementation Plan. See also the response to concern 46.

Concerns	Concern Text	Response Text
46	Concerns with the effects of the proposed action as scoped on climate change and the effects of climate change on project activities.	Effects of the refined proposed action and alternatives on climate change factors (e.g. greenhouse gases) are disclosed in chapter 3 and are based on the best available information that is relevant to the project.
47	Concerns with the effects of the proposed action as scoped on cultural resources.	Consultation with tribes is ongoing. Effects of the refined proposed action and its alternatives on cultural resources are disclosed in chapter 3 under heritage resources. See chapter 2 for project design features to minimize negative effects to resources and encourage cultural practices such as cultural burning.
48	Concern with the effects of the proposed action as scoped on economics.	Effects of the refined proposed action and alternatives on economics is disclosed in the social and economic section of chapter 3. See also response to concern statements 16 and 17.
49	Concern with the effects of the proposed action as scoped on forest Health.	Effects of the refined proposed action and alternatives on forest health is disclosed in the vegetation section of chapter. See also response to concerns 2, 3, 10, 13 and 20.
50	Concern with the effects of the proposed action as scoped on fire and fuels.	Effects of the refined proposed action and alternatives on fire and fuels will be disclosed in the fuels section of chapter 3. See also response to concerns 6, 11, 13 and 14.
51	Concern with the effects of the proposed action on recreation and scenery.	Effects of the refined proposed action and alternatives on recreation and scenery in chapter 3. See also response to concerns 31 and 33.
52	Concern with the effects of the proposed action on Aquatic Conservation Strategy objectives and flooding and sediment in streams, especially in relation to safety and community protection.	Effects of the refined proposed action and alternatives on the Aquatic Conservation Strategy, safety and community protection related to flooding, landslide risk, and sediment will be disclosed in hydrology, geology and soils sections of chapter 3. Also see the aquatic conservation strategy report for detailed information, as appropriate.
53	Concerns with the effects of the proposed action as scoped on soils, geology and watershed protection.	Effects of the refined proposed action and alternatives on soils, geology (landslides, unstable lands) and watershed protection are disclosed in chapter 3. Project design features have been incorporated into all action alternatives to mitigate effects of the project on watershed resources. See also response to concerns 3 and 25.
54	Concern with the effects of the proposed action as scoped on vegetation, especially timber resources.	Effects of the refined proposed action and alternatives on vegetation are disclosed in chapter 3.
55	Concern with the effects of the proposal as scoped on invasive vegetative species (noxious weeds).	Effects of the refined proposed action and alternatives on invasive plant species will be disclosed in chapter 3.

Concerns	Concern Text	Response Text
56	Concerns with the effects of the proposed action as scoped on roadless characteristics of Inventoried Roadless Areas.	Effects of the refined proposed action and alternatives on the Roadless character of IRAs are disclosed in chapter 3. See also response to Concern 5.
57	Concerns with the effects of the proposed action as scoped on wildlife species and habitat.	Effects of the refined proposed action and alternatives on wildlife species and habitat are disclosed in chapter 3. See also response to Concerns 20, 21 and 22.
58	Comments received that indicate no support for the project as proposed.	Comments will be considered by the responsible official in making the decision.

Public Open House Summary Input

The Forest Service sponsored public open houses prior to the release of the draft EIS:

Table B-2: Open houses offered prior to the release of the draft EIS

Date	Time	Location
Friday, January 30, 2015	1800-2000 hours	Klamath National Forest Headquarters, Yreka, CA
Saturday. January 31, 2015	1200-1400 hours	Fort Jones Community Center, Ft. Jones, CA
Tuesday, February 3, 2015,	1800-2000 hours	Klamath River Community Center, Klamath River, CA
Wednesday, February 4, 2015	1800-2000 hours	Karuk Senior Nutrition Center, Happy Camp, CA
Friday. February 6, 2015,	1530- 1730 hours	Salmon River Restoration Building, Sawyers Bar, CA
Friday, February 13, 2015,	1800-2000 hours	Seiad Valley Volunteer Fire Department, Seiad, CA

Input from the public was captured in flipchart notes and comments. These notes are verbatim except for minor corrections for abbreviations etc. Where no notes are provided, it is because no comments were made by the public on provided flip charts at the meeting in question. Also included is a follow-up comment the Forest Service received from interested parties about the public open houses.

January 31, 2015 (Fort Jones Community Center, Ft. Jones, CA):

- "I want the most aggressive Harvest project available. None of the plans are aggressive enough!" Local resident, Horse Creek, CA
- "Salmon River wants 'Ground-based' especially in light of all previous rds (roads) built for such."
- "I like ASAP salvage + ongoing tree planting + summer use of major roads."
- "I want fuels treatment as regular daily FS work and salvage after fires to keep forests healthy to avoid lg. fires."
- "Read Ernest Hayden's stories of old firefighting in Trinity circa century change plus retired Oak Knoll F.S. or residents to see how handfuls of men could put out the most egregious (quicker than modern workers can back fire)."
- "In 40 years here: saw most "backfires" get out of control and burn more."
- "Comments made that private roads are listed as F.S. roads = contention"

A local group of ranchers had gathered and shared their comments on logging, fire suppression and special interest group input into projects such as these as well as their own opinions of the positon of the agency and their past practices. They became very passionate about their viewpoints and at times had volume and conviction behind their inflection and tone.

February 4, 2015 (Karuk Senior Nutrition Center, Happy Camp, CA):

- "Our watersheds have <u>way</u> more than monetary value."
- "Much of the project is Karuk Ancestral Territory."
- "Nearly ½ of the project area is in LSR (must protect and enhance.)"
- "The rest of the majority would affect W&S Rivers, & other sensitive viewsheds (VQO); salvage logging scars the landscape for decades."

- "200 miles of dozer line from 2014 fires. How many in the project area? Are they being considered?"
- "How many owls affected by the fire? How many in the project area? How are you treating NSO home range?"
- "How are you following the NSO recovery plan? Most of the project area is in critical habitat."
- "How are you considering wildlife connectivity? The project are would affect two of four main corridors."
- "What survey and manage species are being considered?"
- "How many endemic species plant and animal would be affected? Like the Siskiyou Mtn Salamander."
- "There is a duty to restore and protect endangered, threatened, listed (Candidate) and sensitive species."
- "Must consider the ecological & social costs!"
- "What you do on the landscape directly affects the people."
- "Must follow CWA for impaired rivers COHO."
- "What about the shred values with partners?"
- "Green trees should be retained."
- "Moderate Severity areas will re-seed."
- "How much $ has been spent on planning?"
- ""'Alt 4 – concern about lop and scatter fuels treatment in RR for <16" Trees & fuel levels that will create."
- " – agree that it is prudent to not plant if the fuels cannot be treated 1st."
- " – would like to see some broadcast burning where appropriate to provide the most effective fuels treatment after harvest on other fuel treatment."
- "Restoration should include prescribed fire burn plans for the reintroduction of fire on the landscape."
- " – Forest transportation system should be reduced rates than increased."
- " – USFS should collaborate with stakeholders to ID areas of agreement & priorities for treatment."
- " - Address legacy sites."
- "Honestly Consider NO ACTION ALTERNATIVE & concentrate on main roads only fuels a & hazards."
- " How are existing NEPA projects being considered?"

Additional Comments supplied by Kimberly Baker of Klamath Forest Alliance in a handout:

- Real Recovery= Natural Recovery
- Collaborate with CA Dept. of Fish and Wildlife
- Incorporate CA State Wildlife Action Plan and CA Climate Strategy -Habitat and Biodiversity
- Follow recommendations in the National Fish, Wildlife and Plant Climate Adaption Strategy
- Consider peak flows, especially because of agency/science climate predictions for extreme weather events e.g. Floods
- How much volume is being proposed for extraction?

- Don't turn our forests into waste lands- like Salmon Salvage, Panther and Caribou. Salmon Salvage is a mess, thick slash throughout most units, ground and soils are disturbed, any natural regeneration is being hindered and creeks are running brown. Panther is still an eyesore from the Pacific Crest Trail.
- Have you completed monitoring requirements for Caribou Salvage? River communities and our watersheds need restoration
- Please work with affected river communities on a reasonable alternative
- Why have one Alt. for owls and one for fish? Agency has a duty to restore multiple species, particularly Coho, Northern spotted owls and Pacific Fishers.
- Maintain fire with fire Consider replanting dozerlines.
- There is a need to update sediment source inventories and use these in analysis for DEIS.
- How have past fire increased sediment? How much?
- Consider regional demographic studies and annual reports for Northern Spotted Owl.
- Roads are running sediment into Whites Gulch, as well as Salmon Salvage area. Is the agency surveying for fungi?

February 4, 2014 (Karuk Senior Nutrition Center, Happy Camp, CA)- Notes by Gregg Bousfield

- Kimberly Baker asked Tom Mutz a question about Coho Salmon that he deferred to Gregg for an answer.
- "Regarding the effects to Coho," Gregg communicated, "water quality was the topic of discussion, bringing up the fact that we meet the TMDL (Total maximum daily load) on the Klamath, Scott and Salmon Rivers. We use our water quality waiver to meet those criteria."
- He explained how a big piece of the waiver is about treating legacy sites; inventory, prioritize and schedule those legacy sites to meet the waiver. He stated that due to the large scale of the project, an alternative agreement was made with the water board to only address legacy sites within USFS watershed condition framework focus watersheds where they overlap the project area.
- For instance, since Elk Creek is the next focus watershed for the Klamath River TMDL, the only NEPA coverage needed under WFR is Elk Creek. This appeared to be an issue for them. To meet the Scott and Salmon River TMDLs, the forest will schedule out legacy site treatments where they overlap the WFR project area using existing NEPA: the Lower Scott and North Fork Salmon Rivers road projects
- Susan and Kimberley's responses were: Why Elk Creek? Grider Creek should be considered due to it being more impacted (in their opinion) by the fire than Elk Creek. The projects connected actions (temp roads, landings, etc.) will cause additional impacts on top of the wildfire impacts. The Forest appears to not be doing enough in the Grider Creek watershed to offset the projects impacts.
- The feedback from Gregg is that the Forest can't shotgun our treatments across the landscape and that we need to follow the USFS watershed condition framework because that is where appropriated funds go. A legacy site inventory in Elk Creek had been completed and appropriated dollars for planning was on the program of work prior to the fire.

- They were still concerned that activities in the Grider creek area will cause more erosion and impact the watershed even more.
- Gregg stated that Alternative 4 addresses this by dropping temp roads and landings where they would have the most impact to water quality and that Lop and Scatter treatments in salvage units within Riparian Reserves would aid in minimizing these impacts.
- Additional concerns were voiced in respect to Alternatives 3 and 4 stating that they should be combined. Gregg explained that effects to NSO are bound by a larger analysis area. Hence Alternative 3 requires much more changes to show a measurable difference in effects. Whereas the watershed alternative focuses on site specific project design features that may not be as wide spread.
- Some general comments on road decommissioning, design features, workload capability and that implementation monitoring is needed to ensure that project design features are being carried out. Gregg added that sometimes you have to train the crews on how to layout and identify riparian reserves, adding that supervising these crews would be paramount.
- Implementation was a great concern, oversight being paramount as well as workforce.

February 6, 2015 (Salmon River Restoration Building, Sawyers Bar, CA)

- “There’s broad consensus on post fire work on 1.) roadside safety along main and important travel ways; 2.) Defensible space around private property; 3.) Strategic ridgetop fuel breaks.”
- “Salvage logging shouldn’t be used to Rush timber production at the expense of cultural & wildlife values.”
- “Focus on protecting private and access routes by implementing fuels treatments.”
- “Replanting burn plantations except in very specific areas is a waste of time & resources, could preclude future prescribed burns within the fire footprints.”
- “Roadside hazard(s) should focus on main roads, not seasonally closed or decommissioned roads; use the newly finished MVUM.”
- “It’s critical to get the fire back into the recent fire footprints, within 5 to 10 years of the original burn. The only way we will get our forest back into a healthy fire regime is to use prescribed burns while recent fire footprints for landscape level prescribed burns while the fuels are still manageable.
- If we put plantations in the footprint, it makes it a lot more difficult to plan and implement RX burns on this ground in the future.
- Our traditional plantation.
- “Focus on the fuel breaks we will have after the project is implemented. Think about the fire next time. Get out of cutblock mentality. Start around private and strategic road & Ridgetop fuel breaks. Not just hazard trees, but creating defensible fuel breaks and anchors to light RX burns and stop wildfires.”
- “If you helilog, clean up the slash”
- “These burn footprints need RX fire in the next 3 to 5 years. Site prep and planting precludes burning. *If you are going to plant, do it after you burn, and only in areas where conifers were growing prefire exclusion. Look at the (19)44 aerial photos & Wieslander maps.”*

- “Until landowners feel safe, they will not support large scale burning or support the use of wildfires to achieve resource objectives.”
- “Why are fish and wildlife alternatives separate? Combine them.”
- “Keep the soil on the hillside. Minimize ground disturbance,”
- “Treat all the severely burned area by removing those trees so there is no fuel loading. Suggest helilog areas that are roadless. (Hickey Gulch, Both side of the road.)
- “Maintain fuel breaks, + (plus) fire plan on landscape level and this will drive where projects will be in place in the future. Such as RX burning, thinning, and other ways to reduce fuels.”

Representatives of the Klamath Forest Alliance of Orleans, CA and the Environmental Protection Information Center in Arcata, CA provided the following email comments concerning open houses.

RE: Westside Public Meeting Evaluation

Dear Westside Planners,

Thank you for visiting our Klamath, Salmon and Scott River communities on the recent Westside Open House Meeting tour. Please consider this Westside Public Meeting evaluation on behalf of Klamath Forest Alliance and EPIC-Environmental Protection Information Center. We believe it was appropriate to have at least seven meetings, given that the Westside post-fire project as proposed would affect so many significant values and comprises a very large landscape.

Although there was short notice, less than two-weeks, of the meeting announcement, locations and times, I was able to attend in Happy Camp on February 4th. After arriving, I was dismayed that the Open House structure did not allow for formal introductions, a presentation or group question, answers or discussions. Introductions with the multiple Klamath National Forest staff and contractors and a brief presentation on the five agency alternatives would have been greatly appreciated. People who are less familiar with the staff, significant issues and the National Environmental Policy Act process would have a difficult time navigating and learning through this type of structure.

Since there were so many different Klamath National Forest staff and contractors at the meetings, how will the information and the concerns of the public going to be relayed to the planning team, especially if they were not captured on paper? How will the comments and concerns captured during the public meetings be incorporated or considered in project planning? Is the agency planning any follow up to the meetings? Where and how where Public Meetings Advertised?

Thank you for your attention.

Regards,

Kimberly Baker, Executive Director

Klamath Forest Alliance

PO Box 21

Orleans, CA 95556

Natalynne Delapp, Executive Director

EPIC-Environmental Protection Information Center

145 G. St., Suite A

Arcata, CA 9552

Appendix C: Actions Considered for Cumulative Effects

Current and future foreseeable actions considered for analysis within the twenty-nine 6th field watersheds (Table C-1) that intersect the Westside Fire Recovery Project boundary are listed below. Actions considered for cumulative effects can vary by resource. See chapter 3 for details. Ongoing and future foreseeable actions are discussed in separate sections. The stage of each project is listed in parenthesis. For the purpose of this project, it is assumed that private Timber Harvest Plans (THPs) submitted between 2010 and the present are still on-going and will be analyzed under cumulative effects; THPs submitted prior to 2010 are considered past actions. Additionally, to account for current year salvage projects on private property under cumulative effects analyses, it is assumed that all private lands burned at moderate to high severities are or will be salvage logged.

Table C-1: The twenty-nine 6th field watersheds that intersect the Westside Fire Recovery Project boundary separated by fire area subpart.

Subpart	6th Field Watershed	
A - Beaver	McKinney Creek – Klamath River	Hungry Creek – Beaver Creek
	Horse Creek	West Fork Beaver Creek
	Kohl Creek – Klamath River	Little Humbug Creek – Klamath River
	Empire Creek – Klamath River	Dutch Creek – Beaver Creek
B – Happy Camp Complex	Scott Bar – Scott River	Lower Indian Creek
	Bittenbender Creek – Klamath River	Grider Creek
	Canyon Creek	Upper Elk Creek
	Kelsey Creek	Lower Elk Creek
	East Fork Elk Creek	Oak Flat Creek – Klamath River
	Kohl Creek – Klamath River	Tompkins Creek – Scott River
	Seiad Creek	China Creek – Klamath River
C - Whites	Whites Gulch – North Fork Salmon River	South Russian Creek
	Little North Fork Salmon River	Sugar Creek – Scott River
	French Creek	North Russian Creek
	Main East Fork South Fork Salmon River	Yellow Dog Creek – North Fork Salmon River

On-going Actions (Klamath National Forest)

Eddy Late Successional Reserve Project (Implementation):

The Eddy LSR project is located in Siskiyou County, California within various sections of Townships 38, 39, 40, and 41 North, Ranges, 10, 11, and 12 West, Mount Diablo Meridian.

The purpose of this project is to protect late-successional habitat used by the Northern Spotted Owl and other late-successional dependent species, to protect communities, and to create safer emergency access routes. Two objectives were developed for the project based on current conditions (1) habitat protection and (2) community protection. The selected alternative will treat 25, 969 acres in order to protect late-successional habitat and communities. Within those acres, 16 Fuel Reduction Zones (FRZs), totaling 8,291 acres, will be constructed to increase resistance to the spread of wildfires, 17,524 acres of Prescribed Burn treatments will occur to increase resiliency to wildfires and protect habitat, and 60 miles of Roadside (RS) treatments along emergency access routes will be conducted.

Elk Thin Project:

This project is located in the Happy Camp Ranger District of the Klamath National Forest, in Siskiyou County, California. The legal location is various sections in T15-16N, R7-8E, Humboldt Meridian. The purpose and need is to : 1) provide a programmed, non-declining flow of timber products, sustainable through time; 2) Maintain conifer stocking levels and high growth rates commensurate with the capability of the site to produce wood fiber; 3) Manage stands to maintain vigor and resilience to disturbances such as wildfire, insects and disease; and 4) Provide for defense of life and property, maintain water quality in the Happy Camp municipal watershed, and protect suitable habitat for federally listed threatened and endangered species.

Treatments include light thinning and under-burning on 910 acres, and roadside hazard tree removal along two miles of National Forest System Roads.

Fish Meadow Restoration Project:

This project is located in Siskiyou County, California, within Township 47 North, Range 10 West, Sections 32-33, Mount Diablo Meridian.

The purpose of this project is to promote growth and vigor of oaks, reduce conifer encroachment on fish meadow, improve wildlife habitat, and reduce the likelihood of future high intensity wildfire and pine mortality from pine beetle outbreaks. Treatments include thinning of small, understory trees, piling, and pile burning. Additionally, the project area will be under-burned.

Glassups Timber Sale (Implementation): This project is located in Siskiyou County, California within Township 40 North, Range 12 West, Sections 25, 35, 36; Township 40 North, Range 11 West, Sections 18 and 19; Township 39 North, Range 12 West, Sections 11 and 12; Township 40 North, Range 11 West, Sections 29-33, Mount Diablo Meridian. In the project, 206 acres of under burning remain to be completed. These treatments are follow-up activity fuels treatments from the Glassups Timber Sale in 2000.

Goff Fire Fuels Reduction Project (Implementation): This project is located near the community of Seiad Valley, in Siskiyou County, California, within Township 46, Range 12 West Section 1-4, 10-11; Township 47 North, Range 11 West, Section 20, 28-29, 31-33; Township 47 North, Range 12 West, Section 32-36, Mount Diablo Meridian.

The purpose of this project is to reduce fuels within the wildland urban interface affected by the Goff fire. Proposed treatments include the removal of fire damaged trees, non-commercial thinning, chipping, mastication, piling and pile burning.

Happy Camp Fire Protection Project, Phase 2:

This project is located within the Happy Camp Community “defense zone” (within ¼ mile of private property) and the “threat zone” (within approximately 1½ mile of private property), in Siskiyou County, California.

The purpose of this project is to reduce the threat of catastrophic wildfire to the community of Happy Camp by reducing hazardous fuels adjacent to or within 1½ miles of improved private land, and also provide a fuel-break along a strategic ridge that would connect to the road system surrounding the community. Treatments include 221 acres of commercial thinning, 101 acres of pre-commercial thinning, 748 acres of under-burning, and the creation of a 54 acre fuel break from Highway 96 toward Cade Mountain.

Johnny O'Neil Late Successional Reserve Habitat Restoration and Fuels Reduction Project: This project is located north of Horse Creek, Hamburg, and Seiad Valley, in Siskiyou County, California, within Township 47 North, Range 11 West, Sections 15, 22-27; Township 47 North, Range 10 West, Sections 20 and 30; Township 46 North, Range 11 West, Sections 1-3 and 10-15; and Township 46 North, Range 10 West, Sections 6 and 18, Mt. Diablo Meridian.

This project proposes to retain and promote the development of late-successional habitat and reduce the risk of large, high severity wildfires to move toward more ecologically resilient conditions on approximately 7,280 acres of the Johnny O'Neil Late Successional Reserve. Proposed treatments include a combination of under-burning, mastication and thinning of small trees, and thinning of larger trees using variable density thinning techniques.

Lake Mountain Foxtail Pine Botanical Special Interest Area: This project is located near the community of Hamburg, in Siskiyou County, California, within Township 45 North, Range 11 West, Section 17, Mount Diablo Meridian. The project includes pile burning, which is complete, and foxtail pine planting planned for spring 2015.

The purpose of this project is to restore the existing stand of Foxtail pine and promote the continued growth of Foxtail pine within the Lake Mountain Botanical Special Interest Area. Treatments include the hand-thinning , piling and pile burning of conifers (mostly red fire and Doug fir) less than 10 inches DBH on approximately 37 acres within the Lake Mountain Botanical Special Interest Area.

Lower Scott Roads Maintenance and Stormproofing Project:

This project is located throughout the Lower Scott River Watershed (5th field), in Siskiyou County, California

The purpose of this project is to stormproof 40.4 miles of road in the lower Scott river 5th field watershed. Storm-proofing consists of improving road drainage to protect the road surface and upgrading stream crossings to reduce the maintenance needs and protect riparian and stream ecosystems. About 2.05 miles of road will be placed in hydrologic storage, and about 56.95 miles of road will undergo road maintenance work including improving drainage and upgrading road surfaces to reduce sediment delivery to stream systems. The project also added 26 miles of non-system roads to the road system to provide better maintenance of the road in the future.

Lower Scott Roads Project: This project is located throughout the Lower Scott River Watershed (5th field), in Siskiyou County, California

The purpose of this project is to decommission 26 road segments totaling approximately 12 miles. Decommissioning work includes complete removal of all stream crossing fills and culverts, crushing and burying inlets (and/or removal) of cross-drain culverts, partial removal of fill material from swales, outslope road surface, excavate and/or stabilize road cut and fill failures, seed and mulch disturbed areas, and obliterate take-off.

Mill Luther Watershed Restoration Project:

This Project is located on roads throughout the Indian Creek 5th –field watershed, north of Happy Camp, in Siskiyou Country, California.

The projects purpose and need is to protect water quality and fish habitat in the Indian Creek watershed by: 1) reducing the risk of channel/road crossings failing during large storm events; 2) reducing the amount of fine sediment within the road prism, if a failure should occur and 3) reduce the miles of Forest Service system roads to match projected declining road maintenance dollars.

The project would decommission a total of 9.5 miles of NFTS roads, stormproof a total of 90.3 miles of NFTS roads, put 6 miles of NFTS roads into self-maintaining storage and convert 1.8 miles of road into a Forest trail.

North Fork Roads Storm-proofing Project (Implementation):

This project is located in Siskiyou County, California within Township (T) 39N, Range (R) 10W, Sections 4, 5, and 8 Mount Diablo Meridian (MDM); T39N, R11W, Sections 3-6, 10, 11, 14, 15, and 16 MDM; T39N, R12W, Sections 7-12, and 16 MDM; T40N, R10W, Sections 8, 9, 14-16, 18-23, 29-30 MDM; T40N, R11W, Sections 7, 12-13, 18-19, 26, 29, 31-36, MDM; T40N, R12W, Sections 11-17, 24-26, and 34-36 MDM; T41N, R10W, Sections 20-21, and 28-29 MDM; T41N, R11W, Sections 31, and 35 MDM; T41N, R12W, Sections 26-27, and 35 MDM; T10N, R8E, Sections 6, and 16 Humboldt Meridian (HM); T11N, R8E, Sections 28, and 31 HM.

The purpose of this project is to reduce stream sedimentation originating from roads. Approximately 90.8 miles of roads (32 roads total), within the North Fork Salmon River watershed, were identified for storm-proofing. Storm-proofing may entail any or all of the following treatments: outslope road surface (3-5 percent), minimize road width, apply rock aggregate, add rolling dips, stabilize road prism landslides, upgrade stream crossing culverts, treat stream crossings to reduce fill, eliminate in-board ditches, and spot rocking.

Oak Flat Thin Project:

This project is located in Siskiyou County, California within Township 17 North, range 6 east, Section 2, 11; Township 16 North, Range 6 East, Section 25, 36; Township 16 North, Range 7 east, Section 19, 28-32; Township 15 North, Range 7 East, Sections 5, 6, Humboldt Meridian.

The purpose of this project is maintain stand health and resilience, provide a flow of timber products, restore fire to its natural role, and to protect and enhance conditions of late-successional reserves. Treatments include commercial thinning and subsequent fuels treatment on approximately 438 acres, and under-burning on an additional 570 acres outside of commercial thinning units.

Petersburg Pine Restoration Project:

This project is located near the community of Cecilville, in Siskiyou County, California, within Township 37 North, range 11 West, Section 3-12, 14-18; Township 38 North, Range 25 West, Section 25, Mount Diablo Meridian.

The purpose of this project is to reduce hazardous fuels in the Cecilville area, retain and reestablish forest ecological resilience, and improve wildlife habitat by implementing the Forest Elk management Strategy and meet the big game objectives of the Forest Plan. Proposed treatments include thinning, fuel reduction (fuels-breaks, roadside, and WUI), and under-burning activities on 7,350 acres.

Salmon Reforestation Project (Implementation):

This project is located near Sawyers Bar and Forks of the Salmon, in Siskiyou County, California, within Township 40 North, Range 11 West, Section 7-10, 15-21, and 30; Township 41 North, Range 12 West, Section 35; Township 40 North, Range 12 West, Section 10-24 and 27-31, Mount Diablo Meridian; Township 10 North, Range 8 East, Section 4-6 and 8-9; Township 11 North, Range 8 East Section 28 and 32-33, Humboldt Meridian.

The purpose of this project is to promote reforestation and reduce fuel loading in areas to be planted on National Forest System lands burned during the Salmon Complex (part of the Forks Complex). The proposed treatment is needed to facilitate establishment of forest cover and diversity within the burned plantations and natural stands and reduce the amount of hazardous fuels created by fire-related tree mortality. This project will maintain, protect and eventually restore conditions of late-successional and old growth forest ecosystems, which serve as habitat for associated organisms. Proposed treatments include approximately 395 acres of site preparation and planting and approximately 510 acres of planting only (including 340 acres of Salmon Salvage Project units and 170 acres of Inventoried Roadless Areas) for a total of 905 treated acres. The Salmon Salvage Project units are proposed to be planted regardless of the salvage harvest.

Salmon Salvage Project:

This project is located at T40N R11W S7-10, 15-21, 30; T41N R12W S35; T40N, R12W S 10-24 and 27-31, Mount Diablo Meridian; T10N R8E S 4-6 and 8-9; T11N R8E S28 and 32-33, Humboldt. The 14,779-acre project area is within the area burned by the Salmon Complex in 2014. The project is intended to abate hazard trees along the roads, salvage fire-damaged trees and to aid in reforestation of the area. The project will meet the purpose and need on about 1,240 acres by salvage logging (on about 270 acres) and removing roadside hazard trees (on about 973 acres along 23 miles of road).

Seiad Creek Legacy Roadbed Rehabilitation Project: This project is located north of Seiad Valley, in Siskiyou County, California, within T 46N, R 11W, Sections 5, 7, and 8; T 47N, R 11W, Sections 18, 20, 27, 28, 32-34; and T 47N, R 12W, Sections 13, Mt Diablo Meridian.

The projects purpose and need is to: 1) improve the condition of the Seiad Creek watershed as defined in the USFS Watershed Condition Framework; 2) Repair legacy sediment sites to address sediment load allocations of the Klamath Stream Temperature TMDL and conditions of the water board waiver and 3) maintain and restore the condition of Riparian Reserves and in steam aquatic habitat

Treatments include hydrologic stabilization of about 6 miles of existing roadbeds and maintenance of about 5 miles of NFTS roads needed to access the existing roadbeds.

Singleton Project:

This project is located near Scott Bar, in Siskiyou County, California, within Township 45 North, Range 9 west, Section 10, 16, 18, 20, 32; Township 45 North, Range 10 West, Section 24, 26, Mount Diablo Meridian.

The purpose of this project is to promote late-successional and old-growth habitat, increase the resiliency of mid-seral vegetation, and to promote connectivity between late-successional reserves. Proposed treatments include commercial thinning, non-commercial thinning, under-burning, roadside fuels reduction, maintenance of existing fuels breaks, and creation of new fuel breaks.

South Taylor Roadside Hazard Project:

This project is located southwest of Callahan, in Siskiyou County, California within Township 38 North, Range 11 West, Sections 11-14, and 25 and Township 38 North, Range 10 West, Sections 2-4, 6-10, 15-17, 19, Mount Diablo Meridian.

The purpose of this project tis reduce threats to public safety along National Forest Transportation System roads open to public use within the Taylor late-successional reserve. Roadside hazard trees will be mitigated on approximately 23 miles of road along system roads 38N03, 38N04, 38N07, 38N10, and 38N14. Merchantable hazard trees will be felled and removed while non-merchantable trees will be felled and left on-site.

Sugar Creek Watershed Improvement Project:

This project is located in Township 40 North, Range 8 West, Section 4 and Township 40 North, Range 9 West, Section 1-3, 9-11, 14-17, 20-21, 24, 26, 28-29, 32-34, Mount Diablo Meridian.

The purpose of this project is improve watershed condition and restore vegetative cover and natural stream shade in areas where shade has been reduced by roads, mines, and other human disturbances. Treatments include road work (storm-proofing, storage, and hydrological stabilization), rehabilitation of three mine sites, meadow rehabilitation, and gully stabilization.

Thom-Seider Vegetation Management and Fuel Reduction Project:

This project is located in between Hamburg and Happy Camp, in Siskiyou County, California within Township (T)16N, Range (R) 7E, Sections 1, 2, 11-14 and 24; T17N, R7 E., Sections 1, 2, 11-13, 24, 25, 35, and 36; T18N, R7E, Sections 1-3, 10-15, 22-26, 35 and 36; T19N, R7E, Sections 33-36; T16N, R8E, Sections 4-6, 7-9, 15-18, 19-20 and 28-30; T17N, R8E, Sections 4-6, 7-9, 16-21, and 28-33; T18N, R8E, Sections 7-9, 16-21, and 28-33; Humboldt Meridian. T45N, R10W, Sections 6 and 7; T46N, R10W, Sections 19, 29,and 30-32; T45N, R11W, Sections 1-18; T46N, R11W, Sections 3-10 and 13-36; T47N, R11W, Sections 7-10, 15-22, and 27-34; T45N, R12W, Sections 1-21; T46N, R12W, Sections 1-36; T47N, R12W, Section 7, 8, and 13-36; Mount Diablo Meridian.

The project is intended to reduce the potential for high-severity wildland fires to harm people private and public land, and older forest habitats by responding to the increasing density and fuels hazard evident along the Klamath River between Hamburg and Happy Camp, California. Treatments include thinning and understory burning on 29,300 acres within and adjacent to the wildland urban interface.

Two Bit Vegetation Management Project:

This project is located in Siskiyou County, California within Township 16 North, Range 6 East, Section 1-4, 10-11; Township 16 North, Range 7 East, Sections 5-6; Township 17 North, Range 6 East, Sections 1-4, 9-16, 21-28, 33-36; Township 17 North, Range 7 East, Sections 2-36, Township 18 North, Range 6 east, Sections 1-5, 8-17, 19-30, 32-36; Township 18 North, Range 7 East, Sections 3-20, 15-22, 26-35; Township 19 North, Range 6 East, Sections 32-36, Township 19 North, Range 7 East, Sections 31-33, Humboldt Meridian; and Township 41 South Range 6 West, Sections 7-9, 15-18; Township 41 South, Range 7 West, Sections 12-15, Willamette Meridian.

The purpose of this project is to sustain diverse, fire-resilient ecosystems and a functioning forest and watershed while providing a flow of timber products on about 9,530 acres of National Forest System land. Treatments include 1, 980 acres of thinning, 140 acres of specialized treatments (pole harvest, sanitation thinning, and hardwood release), 160 acres of meadow enhancement treatments, and prescribed under-burns on 7, 250 acres. . In addition, this project will decommission approximately 4.1 miles of National Forest Transportation Systems roads.

Burned Area Emergency Response Work (On-going):

Burned Area Emergency Response (BAER) is currently underway. Implementation of BAER treatments for the Beaver, Happy Camp Complex, and Whites incidents must be completed within one year of their respective containment dates. For the Beaver fire, approved treatments include protection of cultural sites, noxious weed detection and removal, and about road drainage treatments. For the Happy Camp Complex and Whites fire, approved treatments include protection of cultural sites, noxious weed detection and removal, trail safety and drainage treatments, and road drainage treatments. The Happy Camp Complex, Beaver Fire and Whites Fire BAER road packages include road drainage treatments on about 94 miles, 27 miles and 32 miles, respectively.

Livestock Grazing Allotment:

There are nine active livestock grazing allotments within the Westside Fire Recovery Project area. Allotments are managed using an Adaptive Management Strategy intended to move or maintain Forest resources toward desired condition and Forest plan objectives. Table C-2 provides the name, status, use period, and permitted number of cattle for each active livestock grazing allotment within the Project area.

Table C-2: Active Livestock Grazing Allotments within the Westside Fire Recovery Project area.

Allotment Name	Status	Use Period	Permitted Cattle (Pairs)	Notes
East Beaver	Active	April 1 - June 15	44	Includes number of animals permitted on private
		June 16 – Oct. 30	250	
Dry Lake	Active	April 15 - June 9	116	Includes number of animals permitted on private
		June 10 – Oct. 15	170	
Horse Creek	Active	April 15 – Oct. 15	101	Includes number of animals permitted on private
Lake Mountain	Active	July 15 – Oct. 15	25	Part of Lake Mountain Middle Tompkins On-going Project

Allotment Name	Status	Use Period	Permitted Cattle (Pairs)	Notes
Middle Tompkins	Vacant	NA	NA	Part of Lake Mountain Middle Tompkins On-going Project
Big Ridge	Active	July 15 – Oct. 15	120	Allotment is in Wilderness = No Project Activity Units
Marble Valley	Active	July 15 – Oct. 15	35	
Etna Creek	Active	July 15 – Oct.15	54	Includes number of animals permitted on private
South Russian	Active	July 15 – Oct. 15	40	

On-going Actions (Private)

Non-industrial Timber Harvest Management Plans: Grider Creek Land Company:

This Company has two non-industrial harvest management plans located within subpart B of the Westside Fire Recovery Project area. One unit is 37 acres and is located in Township 46 North, Range 12 West, Section 10, 11, 14, 15, Mount Diablo Meridian. The second unit is 60.2 acres and is located in Township 46 North, Range 12 West, Section 11, 14, Mount Diablo Meridian

Timber Harvest Plans (THP):

Since 2010, 12 THP's have been submitted within the twenty-nine 6th field watersheds intersecting the Westside Fire Recovery Project area. Table C-3 lists the year the THP was submitted, the THP number, timber owner, the acreage for which they have THP's in place and the 6th field watershed that they are located in.

Table C-3: Active Timber Harvest Plans within the Westside Fire Recovery Project area.

THP Year	THP #	6th Field Watershed	Timber Owner	Acres
2010	50	Hungry Creek-Beaver Creek	Fruit Growers Supply Co.	291.02
	68	Scott Bar-Scott River		928.95
2011	11	Scott Bar-Scott River		19.32
	21	French Creek	Donna and Arleigh Reynolds	99.63
	27	Dutch Creek-Beaver Creek	Fruit Growers Supply Co.	550.37
	85	Kohl Creek-Klamath River	Michigan California Timber Co	231.7
		Mckinney Creek-Klamath River		122.12
2012	87	Little Humbug Creek-Klamath River	Michigan California Timber Co	30.22
		Mckinney Creek-Klamath River		917.97
	90	Mckinney Creek-Klamath River		8.12
2013	41	Dutch Creek-Beaver Creek	Fruit Growers Supply Co.	600.89
		Little Humbug Creek-Klamath River		163.03
		Mckinney Creek-Klamath River		2473.69
	75	French Creek	Michigan California Timber Co	1505.43
2014	17	Lower Indian Creek	Northwest Skyline Logging	19.39
		Oak Flat Creek-Klamath River		70.35

THP Year	THP #	6th Field Watershed	Timber Owner	Acres
	28	Scott Bar-Scott River	Dan Larivee	0.05

Emergency Timber Harvest Plans:

In order to account for current year salvage projects on private property, it is assumed that all private lands burned at moderate to high severities are being salvage logged.

Future Foreseeable Actions (Klamath National Forest)

Craggy Vegetation Management Project (In Development):

This Project is located in the Humbug Creek and Yreka Creek 6th field watersheds in Siskiyou County, California, within Township 46 North, Range 8 West, Sections 12, 23-28, 32-35; Township 45 North Range 8 West, Sections 1-17, 21-24; Township 46 North, Range 7 West, Sections 16-18, 20, 22, 28, 30, 32-34; and Township 45 North, Range 7 West, Sections 3-5, 8-9, 17-20, Mount Diablo Meridian.

The purpose of this project is to protect communities and promote forest health on approximately 5,000 acres. Planned treatments include fuels reduction, vegetation management, and improvement to deer winter range habitat.

East End Vegetation Management Project (Planning-On Hold):

This project is located in the Beaver Creek watershed, Siskiyou County, California, in Township 48 North, Range 8 West, Sections 22, 23, 26, and 27, Mount Diablo Meridian.

The purpose of the project is to reduce stand density, promote structural and species diversity, and promote resiliency to large-scale disturbances. Treatments are proposed on approximately 1,200 acres and consist of commercial and non-commercial thinning with subsequent fuels treatments. A Proposal for this project is currently being developed, and an EIS is expected.

Elk Creek Watershed Condition Framework Project (In Development):

This project is located within the Elk Creek 5th –field watershed south of Happy Camp in Siskiyou County, California. The purpose and need and proposed actions are currently being developed. The Elk Creek watershed was recently selected as the Happy Camp Oak Knoll Districts priority watershed under the USFS Watershed Condition Framework. The project will be an integrated resource management project likely including fuels treatments, commercial and non-commercial thinning, meadow restoration and transportation management actions.

McCollins Late Successional Reserve Enhancement Project (Planning):

The McCollins LSR Enhancement project is located east of Horse Creek, in Siskiyou County, California in Township 46 North, Range 9 West, Sections 9, 10, 15-22, 27-33; and Township 46 North, Range 10 West, Sections 13, 21-28, and 32-36, Mount Diablo Meridian.

The purpose of the project is to (1) promote the continued development and retention of Late Successional Old Growth conditions; (2) promote resilience of early-and mid- seral vegetation to large-scale disturbance events such as wildfire or insects and disease; (3) restore and maintain pine/oak forest type, oak woodlands, and wildlife habitat; and (4) reduce wildfire threat and potential fire intensity within the WUI, especially surrounding private residences and structures. Treatments are proposed on approximately 2,700 acres and consist of commercial and non-commercial thinning, and the subsequent pilling and burning of activity generated fuels.

Jess Project (Planning):

This project is located in Township 40 North, Range 12 West, Sections 23, 24, 26-28, and 34-36; Township 40 North, Range 11 West, Sections 28-33; Township 39 North, Range 12 West, Sections 1-4, and 9-12; and Township 39 North, Range 11 West, Sections 4-6, Mount Diablo Meridian.

The purpose of the project is to (1) manage fuel loadings to reduce the risk of wildfires affecting nearby communities; (2) improve compositional, structural, and functional, attributes of biological diverse forest ecosystems by restoring ecological processes that build resiliency to high-intensity wildfire and insect and disease infestation; and (3) provide a broad range of ecosystem services including wood products, rural economic health, biodiversity, and beneficial use of water. The preferred alternative will treat approximately 1, 960 acres including 810 acres of commercial timber harvest 140 acres of non-commercial treatments to increase growth and vigor in young plantations (includes 70 acres of hand piling of small diameter trees <9inches diameter at breast height and burning the piles, 60 acres of mastication, and 10 acres of meadow treatments), 185 acres of non-commercial ridgetop treatments to reduce fuels and improve defensibility of the area against wildfire(includes 85 acres of hand piling of small diameter trees < 9inches diameter at breast height and burning the piles, 70 acres of mastication intended to rearrange the fuels and reduce ladder fuels, and 30 acres in two fuel breaks that will be treated to remove small diameter trees and hazard trees), and 250 acres of under-burning.

Lake Mountain and Middle Tompkins Grazing Allotment Management Plan Project (Under Analysis):

This project is located near Lake Mountain and Tom Martin Peak, in Siskiyou County, California, within Township 44 North, Range 11 West, Sections 3-10, and 16-18; Township 44 North, Range 12 West, Sections 1, 12, and 13; Township 45 North, Range 11 West, Sections 2-5, 8-11, 14-18, 19-23, and 26-34; Township 45 North, Range 12 West, Section 25 and 36; and Township 46 North, Range 11 West, Section 17, 20, 21, 26-29, and 32-36, Mount Diablo Meridian.

The proposed project authorizes grazing permits for 10 years under an Adaptive Management Strategy and updates Allotment Management Plans (AMPs) for the Lake Mountain and Middle Tompkins allotments. The project includes redevelopment of Lookout Spring in the Lake Mountain Allotment with construction of a half-acre ex-closure around the springhead and seep, and the placement of a fence around the Faulkstein head-cut to prevent cattle from accessing unstable ground. Additionally, the project includes altering the Lake Mountain Allotment boundary by removing 4,697 acres, most of which are areas where suitable forage is severely limited and to increase Middle Tompkins Allotment by 2,034 acres, correcting a known boundary issue to include areas of historically utilized forage.

Lovers Canyon Project (Under Analysis): This project is located west of Fort Jones, in Siskiyou County, California, within Township 44 North, Range 12 West, Section 25 and 36; Township 44 North, Range 11 West, Section 19, 21, 25-35; Township 43 North, Range 12 West, Section 1; Township 43 North, Range 11 West, Section 2-8, Mount Diablo Meridian.

The purposed of this project is to improve forest health and diversity, improve threatened and endangered species habitat, implement objectives of the Lower Scott River Fire Safe Council Community Wildfire Protection Plan, and provide commodity outputs. The project will treat approximately 2,700 acres within the 11,810 acre project boundary. Proposed treatments include 2,400 acres of thinning; 190 acres of created fuel breaks; removal of hazard trees along National Forest System roads, county roads, campgrounds, and other high use recreation areas within the project boundary; and prescribed burning.

Scott Bar Mountain Underburn and Habitat Improvement Project (Under Analysis):

This project is located west of Fort Jones, in Siskiyou County, California, within Township 44 North, Range 11 West, Sections 14, 15, 22-27, Mount Diablo Meridian.

The purpose of this project is to reduce hazardous fuel loading, maintain currently acceptable fuel loadings, improve wildfire defensibility, enhance foraging habitat for deer and turkey, and protect Scott Mountain salamander habitat. The proposed action will treat approximately 1,660 acres within the 1,960 acre project boundary. Treatments include 1,660 acres of under-burning to reduce encroachment in openings and meadows, and the creation of a 1.5 mile shaded fuel break along lower portions of western and eastern private boundary flanks and southern private land boundaries.

Sawyers Bar Fuels Reduction Project:

Located at T40N R11W S20-22, 27-30. The project is a 2,600 acre underburn intended to reduce fuels near the community of Sawyers Bar, California.

Forest Service Funded Projects on Private Land

One Forest Service funded project on private land will be implemented within the Westside Fire Recovery project area in 2015-2016 with fuel reduction units of about 100 acres within the Happy Camp Fire Area in T46N, R10W, Section 31, and T46N, R12W, Sections 10, 11, 13, 14, and15 nearby the communities of Hamburg, CA and Seiad Valley, CA. Another Forest Service funded project on private land will be implemented within the Westside Fire Recovery project area in 2016-2017 to reduce fuels on about 80 acres around the community of Scott Bar, CA.

Appendix D: Best Management Practices

Best Management Practices (BMPs) were developed to comply with Section 208 of the Clean Water Act. BMPs have been certified by the State Water Quality Resources Control Board and approved by the Environmental Protection Agency (EPA) as the most effective way of protecting water quality from impacts stemming from non-point sources of pollution. These practices have been applied to forest activities and have been found to be effective in protecting water quality within the Klamath National Forest (Forest). Specifically, effective application of the Region 5 Forest Service BMPs has been found to maintain water quality that is in conformance with the Water Quality Objectives in the North Coast Regional Water Quality Control Board's Basin Plan (http://www.waterboards.ca.gov/northcoast/water_issues/programs/basin_plan/).

Region 5 Forest Service BMPs have been monitored and modified since their original implementation in 1979 to make them more effective. Numerous on-site evaluations by the North Coast Region Water Quality Control Board have found the practices to be effective in maintaining water quality and protecting beneficial uses.

The Forest monitors the implementation and effectiveness of BMPs on randomly selected projects each year. From 2000 to 2012, BMP implementation requirement were met on 78-100 percent (91 percent average) of sites sampled, and BMP effectiveness requirements were met on 88-100 percent (94 percent average) of the sites sampled (USDA Forest Service, 2013c). The critical BMP evaluation is *effectiveness* which is a field evaluation to determine how well the BMP worked to prevent sedimentation. The success rate for effectiveness has been in the high 80s and 90s each year since 1993.

Best Management Practices first identified and utilized by the Klamath National Forest are listed in appendix D of the Forest Plan. These basic BMPs have been revised over the years, and are currently similar to those listed in the 2012 Region 5 BMP update in Chapter 10 of the Soil and Water Conservation Handbook, which additionally includes a narrative and objective of each (USDA USFS 2011); and where there are differences, direction is to employ the newer BMP list. The following 'on-the-ground' prescriptions below are incorporated into the project (see chapter 2 of draft EIS).

BMP 1.1 – Timber Sale Planning Process:

Requires the Interdisciplinary Team (interdisciplinary team) to consider methods of reducing water quality impacts during the planning phase of a project. This is accomplished during the planning process of the Timber Sale project.

- An interdisciplinary team review was completed and project design features have been incorporated into the project design (See Chapter 2 of the DEIS).

BMP 1.2 – Timber Harvest Unit Design:

Requires the interdisciplinary team to consider methods of reducing water quality impacts due to changes in unit design. This is accomplished during the planning phase of a project. Examples of design changes are restricting timing of tree removal and utilizing less impacting yarding systems.

- An interdisciplinary team review was completed and project design features have been incorporated into the project design (See Chapter 2 of the DEIS).

BMP 1.3 – Use of Erosion Hazard Rating for Unit Design:

Identifies high or very high erosion hazard areas and adjust management activities to prevent downstream water quality impacts; and to increase soil cover for those areas that have a high risk of contributing sediment into streams. This is done during the planning and layout phase of the project.

- Based on field review and site data (percent slope distribution, soil texture), the Forest Soil Scientist determined the surface erosion hazard rating for each treatment unit and prescribed logging systems and soil cover needs based on the erosion hazard rating.

BMP 1.4 – Use of Sale Area Maps for Designating Water Quality Protection:

Identifies sensitive areas and water uses as part of the Timber Sale contract to assist operators in locating water concerns and applying protection methods. This is accomplished during contract preparation and implemented during layout of the sale.

- The Sale Area Map will include all protected stream-courses, unstable land features, springs, wetlands, meadows, water drafting sites, landings, temporary roads, and logging system for each unit.

BMP 1.5 – Limiting Operating Period of Timber Sale:

To prevent soil compaction and erosion from operations during wet weather; and to ensure placement of erosion control structures prior to the onset of winter to reduce water quality impacts. This is accomplished during the timber sale operations.

- The project is proposed to take place during the normal operating season (NOS) that is defined as May 1 to October 31. All ground disturbing activities, whether inside or outside of the NOS, will be implemented according to the Forest's Wet Weather Operation Standards (Klamath National Forest, 2002).
- Areas where soil has been disturbed by project activities within Riparian Reserves must be stabilized prior to the end of the normal operating season, prior to sunset if the National Weather Service forecast is a "chance" (30 percent) of rain within the next 24 hours, or at the conclusion of the operations, whichever is sooner. This includes skid trails that cross swales (i.e. linear depressions perpendicular to the slope contour that do not meet definition for designation as a Riparian Reserve). Restoration generally consists of removing excess sediment, reshaping and waterbarring former approaches, and spreading slash on the former crossing.

BMP 1.6 – Protection of Unstable Lands:

Provides for special treatment of unstable areas to avoid triggering mass slope failure with resultant erosion and sedimentation.

- Tractors and mechanical harvesters will be excluded from all Riparian Reserves associated with stream channels, active landslides, inner gorges, and toe zones of dormant landslide deposits. Hazard tree removal units are the exception. In Hazard tree units the equipment will be excluded from the inner 50 feet of the non-fish bearing Riparian Reserve, one site tree for fish bearing streams and in the perimeter of all active landslides and toe zones of dormant landslides.

- To limit slope disturbance, inner gorge terrain (greater than 65 percent slope) that extends beyond Riparian Reserves will be buffered by 20-foot slope distance and excluded from mechanical equipment activities. In areas where treatments may conflict, a hydrologist will be consulted.
- There will be no salvage logging on active landslides.
- Limit equipment disturbance within 20 feet on either side of swales by minimizing equipment crossings and avoiding running trails up the axis of swales, except at designated crossings.

BMP 1.8 – Streamside Management Zone Designation:

Designates zones adjacent to water and/or riparian areas as zones of special management. This is accomplished during the planning and layout phase of the project.

- Project Riparian Reserves are established in the following manner per the Forest Plan (site tree for Salmon and Happy Camp districts is 170 feet, site tree for Scott and Oak Knoll districts is 150 feet):
    - For fish-bearing streams, it is the area on each side of the stream extending from the edges of the active stream channel to the top of the inner gorge, or to the outer edges of the 100-year floodplain, or to a distance equal to the height of two site-potential trees, or 300 feet slope distance (600 feet total, including both sides of the stream), whichever is greatest. For Salmon and Happy Camp ranger districts, this will be 340 feet (680 feet total).
    - For permanently flowing nonfish-bearing streams, it is the area on each side of the stream extending from the edges of the active stream channel to the top of the inner gorge, or to the outer edges of the 100-year floodplain, or to a distance equal to the height of one site-potential tree, or 150 feet slope distance (300 feet total, including both sides of the stream), whichever is greatest. For Salmon and Happy Camp ranger districts, this will be 170 feet (340 feet total) and 150 feet for the Oak Knoll and Scott River Ranger District.
    - For intermittent streams, , the stream channel and extending to the top of the inner gorge, or extension from the edges of the stream channel to a distance equal to the height of one site potential tree, or 100 feet slope distance, whichever is greatest. For unstable lands, it is the extent of unstable and potentially unstable areas.
    - Consistent with Forest Plan direction, Riparian Reserves for wetlands and springs will be defined by the edge of the feature out to a distance equal to 1 site potential tree. These RRs will be flagged and avoided during salvage harvest.

BMP 1.9 – Determining Tractor Loggable Ground:

Minimize erosion and sedimentation resulting from ground disturbance of tractor logging systems.

- Ground-based harvest equipment will be limited to 35 percent slopes, except when moving from one bench to another on dormant landslide terrain. In addition, ground-based equipment can travel up to 100 feet on slopes 35 to 45 percent.

- Site preparation treatments would be designed to meet soils management direction in the KNF Forest Plan. This may include use of low ground pressure equipment, retaining slash and large woody material and implementing hand treatments instead of mechanical.

BMP 1.10 – Tractor Skidding Design:

Designates a tractor skid pattern over steepened areas, designates tractor crossings, and reduces skid patterns in sensitive areas to reduce erosion and compaction. This is accomplished during the sale layout and operations phase of the project.

- In salvage units and subsequent site preparation, skidding equipment will be restricted to slopes less than 35 percent. Skid trails that connect benches in dormant landslide terrain can have minor portions of the skid trails on slopes greater than 35 percent.
- In site preparation units (where no salvage will occur) felling and skidding equipment will be restricted to slopes less than 45 percent in non-granitic and non-schist soil types (see soils report for locations).
- Use existing skid trails instead of building new skid trails unless using existing skid trails will have greater negative effects. Space skid trails at least 75 feet apart, except near landings and where trails converge. Use no skid trails in areas in which ground-based mechanical equipment is excluded (Designation of new skid trails will be approved by a Timber Sale Administrator. Erosion and sedimentation control structure will be maintained and repaired per the guidance in the Forest Service Handbook 2409.15 R5 Supplement.
- No full bench skid trails will be constructed. Full bench skid trails have the entire skid trail cut into the hillslope.
- Locations where skid trails intersect roads will be obliterated or effectively blocked to vehicle access.

BMP 1.11 – Suspended Log Yarding in Timber Harvesting:

Protect the soil mantle from excessive disturbance; maintain the integrity of the Streamside Management Zone and other sensitive watershed areas, and to control erosion on cable corridors.

- Skyline corridors will be placed on the landscape as to minimize disturbance to active landslides, inner gorges and toe zones of dormant landslide deposits. All skyline and ground-based yarding will require one-end suspension in corridors and on skid trails. Corridors for skyline yarding that are parallel to the stream channel will be placed outside of the Riparian Reserve. The corridor may cross the stream channel with full suspension of logs within ten feet from the stream bank. Apply erosion control measures as necessary in cable corridors to control erosion and runoff. This could include hand construction of water bars and /or spreading slash from adjacent areas.

BMP 1.12 – Log Landing Location:

Locate new landings or reuse existing landings in such a way as to avoid watershed impacts and associated water quality degradation.

- See BMP 2.4

- Existing landings will be used to the extent possible. Existing landings in stream-course Riparian Reserves will not be expanded towards stream channels, or on to active landslides, or where vegetation that provides shade to a stream would need to be cut. Existing landings in Riparian Reserves will be shaped and treated for erosion control at the end of each season of use, and hydrologically restored at project completion (including subsoiling and covering with slash/mulch as needed). Reused landings in Riparian Reserves will have site specific erosion control measures to reduce risk of sediment delivery into streams.
- During opening or construction of any landings, material will not be sidecast into intermittent or perennial stream channels.
- At project conclusion, landings will be configured for long-term drainage and stability by reestablishing natural runoff patterns. All landings will be covered with at least 50 percent effective soil cover. Use of certified weed free materials including straw, wood chips, or mulch may be used where on-site material is insufficient.

BMP 1.13 – Erosion Prevention and Control Measures During Timber Sale Operations:

Ensures that Purchasers operations shall be conducted reasonably to minimize soil erosion. This is accomplished during the pre-operations meeting with the purchaser, and throughout the operations phase of the timber sale.

- Erosion control measures are discussed during the pre-operations meeting with the purchaser and the Forest Service. They are updated throughout the operations phase of the timber sale.
- The Klamath Wet Weather Operation Standards (USDA Forest Service 2002) will be used for all project activities (harvest, hauling, planting).

BMP 1.16 – Log Landing Erosion Prevention and Control:

Works to reduce erosion and subsequent impacts sedimentation from log landings. Timber Sale Contract provide for erosion prevention and control measures on all landings. This is best done by design of landing drainage measures during the planning phase of the project, and implemented during the operations phase.

- See BMP 1.12.

BMP 1.17 – Erosion Control on Skid Trails:

Employs preventive measures such as drainage structures to reduce water concentration and erosion. This is accomplished during the operations phase of the project. Because of the timing of this project, pre-staging of straw bales for timely construction of water bars will be called for.

- Where skidding occurs through units with less than 50 percent soil cover, mulch skid trails of greater than 15 percent slope, to achieve at least 50 percent effective soil cover on skid trails (approximately 40 acres across the project area may require this). Effective soil cover could include plant litter, woody material in contact with the soil, living vegetation, and rock fragments with a diameter of ½ to 3 inches. Use of certified weed free materials including straw, wood chips, or mulch may be used where on-site material is insufficient.

BMP 1.18- Meadow Protection during Timber Harvest:

The objective is to avoid damage to ground cover, soil and hydrologic function of meadows.

- Equipment will be excluded from wetlands or wet meadows (excluding small springs and seeps).

BMP 1.19 – Streamcourse Protection:

Protects the natural flow of streams and reduces the entry of sediment and any other pollutants into streams. The location of stream crossings must be agreed to by the Sale Administrator and the Hydrologist. The accomplishment of the objective of this measure is during the operations phase of the project.

- Tractors and mechanical harvesters will be excluded from all Riparian Reserves associated with stream channels, active landslides, inner gorges, and toe zones of dormant landslide deposits. Hazard tree removal units are the exception. In Hazard tree units the equipment will be excluded from the inner 50 feet of the non-fish bearing Riparian Reserve, one site tree for fish bearing streams and in the perimeter of all active landslides and toe zones of dormant landslides.
- To limit slope disturbance, inner gorge terrain (greater than 65 percent slope) that extends beyond Riparian Reserves will be buffered by 20-foot slope distance and excluded from mechanical equipment activities. In areas where treatments may conflict, a hydrologist will be consulted.
- All hazard trees cut within 25 feet of a stream channel will be left on site unless it continues to pose a threat to safety or accessibility (See watershed-4 for equipment exclusion restrictions). Along fish-bearing stream reaches, all hazard trees greater than 26 inches in diameter at breast height within the first site tree (150-170 feet) will be left on site unless after felling, it continues to pose a threat to safety, infrastructure, forest road drainage system integrity or accessibility.
- Live trees directly rooted into the banks or otherwise integral to the stability of the channel bank will not be felled unless they pose an overhead hazard and, if felled, will be left on site unless this poses a hazard on the ground per Forest Service safety requirements.
- Directional felling will be used to protect streambanks where hazard trees need to be mitigated for public or employee safety.

BMP 1.20 – Erosion Control Structure Maintenance:

Requires periodic inspection of erosion control structures to assess maintenance needs and effectiveness. This is accomplished during the operations and post-operations phase of the project; this ensures the adequacy of erosion control measures.

- Skid trail erosion control work will be kept current during implementation. Erosion control and drainage of skid trails will be complete prior to shutting down operations due to wet weather or at project completion.

BMP 1.21 – Acceptance of Erosion Control Measures Before Timber Sale Closure:

Erosion control measures are inspected for adequacy to ensure erosion control as planned. This is accomplished during the post-operations phase of the project during the contract final inspection.

- At project completion, permanent operating water bars will be installed and/or repaired as necessary on all skid trails, and slash scattered on all skid trails if necessary.
- The Timber Sale Administrator will inspect the Erosion Control Measures for compliance with contract.

BMP 2.4 – Road Maintenance and Operations (Temporary Roads):

The objective is to improve road slope stabilization by applying mechanical and vegetative measures. This is accomplished during the operations phase of the project.

- New temporary roads or landings will not be constructed in any Riparian Reserve associated with stream channels, on toe zones of landslides, active landslides or inner gorges. Exceptions for this project design feature for Alternative 2: Landings # DZ03, DZ10, DZ23, L042, L043, L044, and L090. Further exceptions may be approved if they meet the criteria described in the hydrology effects analysis.
- Following harvest activities achieve at least 50 percent effective soil cover on new temporary roads and block them after the harvest season (prior to the first winter after use). New temporary roads will also be sub-soiled (or tilled) after use.
- All temporary roads (new, existing or re-opened decommissioned roads) will have the takeoffs from system road obliterated or blocked to avoid unauthorized use. All temporary roads will be hydrologically stabilized including removal of culverts and fills at stream crossings, out-sloping of road surfaces, and proper construction of water bars. Erosion and sedimentation control structures (water bars) will be maintained and repaired per the guidance in the Forest Service Handbook 2409.15 R5 Supplement.

BMP 2.4 – Road Maintenance and Operations (System Roads)

- Improvements to existing system roads in the project area will avoid over-steepened road cuts where possible, minimize sidecasting, and maintain ditches, cross drains, and any outsloped road segments.
- Roads will be watered as appropriate to maintain road fines on site. Other materials may be used for dust abatement as approved by the Forest Service.
- Upgrades or improvements to stream crossings will be built to Forest Plan standards.
- Activities which require culvert replacement or removal will occur during the least critical periods for water and aquatic resources: when streams are dry or during low-water conditions; and in compliance with spawning and breeding season restrictions.
- Legacy sediment site treatments within or adjacent to streams will have erosion-prevention techniques applied such as silt fences, straw waddles, or mulch to minimize the risk of discharge.

All project-related temporary structures, materials and project-related debris will be removed from riparian areas and stream channels prior to winter shutdown.

For legacy sediment site repairs, fill materials generated will be reincorporated back into subgrade to the extent possible; all excess fill materials will be spoiled at a site reviewed and approved by Forest Service botanist, watershed, and heritage specialists.

BMP 2.5 - Water Source Development Consistent with Water Quality Protection:

The objective is to limit and mitigate the effects of water source development through the planning of impoundments and withdrawals.

Draft water only at sites designated by the Forest Service.

- When drafting from waters designated as coho salmon Critical Habitat: *NOAA Fisheries Water Drafting Specifications (2001) apply*

10. Intakes will be screened with 3/32" mesh for rounded or square openings, or 1/16" mesh for slotted openings. When in habitat potentially occupied by steelhead trout, intakes will be screened with 1/8" mesh size. Wetted surface area of the screen or fish-exclusion device shall be proportional to the pump rate to ensure that water velocity at the screen surface does not exceed 0.33 feet/second.
11. Use of a NOAA approved fish screen will ensure the above specifications are met.
12. Fish screen will be placed parallel to flow.
13. Pumping rate will not exceed 350 gallons-per-minute or 10 percent of the flow of the anadromous stream drafted from.
14. Pumping will be terminated when tank is full.
15. Additional applicable specifications:
16. There will be no modification/improvement of drafting sites in Coho Critical Habitat.

- Water drafting by more than one truck shall not occur simultaneously.
- When drafting from waters that are not coho salmon Critical Habitat, but do contain fish:

17. For fish-bearing streams, the water drafting rate should not exceed 350 gallons per minute for streamflow greater than or equal to 4.0 cubic feet per second (cfs).
18. Below 4.0 cfs, drafting rates should not exceed 20 percent of surface flows.
19. Water drafting should cease when bypass surface flows drop below 1.5 cfs.
20. Intakes, for trucks and tanks, shall be placed parallel to the flow of water and screened, with opening size consistent with the protection of aquatic species of interest.
21. Fish-bearing streams that are temporarily dammed to create a drafting pool shall provide fish passage for all life stages of fish.
22. When drafting from non-fish-bearing waters:
23. Drafting rate should not exceed 350 gallons per minute for stream flow greater than or equal to 2.0 cubic feet/second.
24. Drafting rate should not exceed 50 percent of surface flow.
25. Drafting should cease when bypass surface flow drops below ten gallons per minute.
26. Drafting by more than one truck shall not occur simultaneously.

- Rock and gravel will be applied to drafting sites if it is needed to prevent stream sedimentation.
- Water drafting sites located in non-fish-bearing waters only may include minor instream modification, such as fine sediment removal and building of board/plastic dams. All boards and plastic will be removed after use.

- Water drafting sites located within fish-bearing stream segments may not be modified, except rocking the approach to prevent sedimentation.

BMP 2.11 - Servicing and Refueling of Equipment:

Prevent fuels, lubricants, cleaners, and other harmful materials from discharging into nearby surface waters or infiltrating through soils to contaminate groundwater resources.

- Refueling will not take place within Riparian Reserves except at designated landings in locations where most disconnected from water resources. A spill containment kit will be in place where refueling and servicing take place.

BMP 2.13 – Erosion Control Plan:

Effectively limit and mitigate erosion and sedimentation from any ground-disturbing activities, through planning prior to commencement of project activity, and through project management and administration during project implementation.

- An Erosion Control Plan will be completed prior to project implementation.
- The Forest's Wet Weather Operations Standards are included in the Erosion Control Plan.

BMP 5.2 – Slope Limitations for Mechanized Equipment Operations:

The objective is to reduce gully and sheet erosion and associated sediment production by limiting tractor use.

- See BMP 1.9 and 1.10.

BMP 5.5 – Disposal of Organic Debris:

The objective is to prevent gully and surface erosion with associated reduction if sediment production and turbidity during and after treatment.

- During site preparation, material greater than 8’’ inches in diameter would not be removed unless needed to reduce 1,000 hour fuel loading to 7 tons per acre, retain as close to 7 tons per acre as possible.

BMP 5.6 – Soil Moisture Limitations for Mechanical Equipment Operations:

The objective is to prevent soil compaction, rutting, and gulling that may result in increased sedimentation and turbidity.

- All ground based equipment will follow the Wet Weather Operation Standards.

BMP 6.3 Protection of Water Quality from Prescribed Burning Effects:

The objective is to maintain soil productivity; minimize erosion; minimize ash, sediment, nutrients, and debris from entering water bodies.

- Prescribed fire effects in Riparian Reserves will mimic a low intensity backing fire, except for handpiles where higher intensity may occur to consume pile material. Ignition of underburns will generally not occur in Riparian Reserves. Approval by the District Fish Biologist is needed for underburn Riparian Reserve ignitions.
- Handpiles and windrows in Riparian Reserves will be placed in a checkerboard pattern whenever possible (not piled directly above another). Handpiles will be less than 6 feet in diameter and will be more than 15 feet away from intermittent streams and 30 feet away from perennial streams.

- For underburning, hand-line construction in riparian vegetation shall be avoided and in general should be farther than 25 feet from stream channels. Handlines will be mitigated (waterbarred and covered with organic material) immediately following prescribed burning, when safe to do so.

References for Best Management Practices

USDA Forest Service. 2013c. Klamath National Forest Best Management Practices Evaluation Program: Water Quality Monitoring Report 2013. Klamath National Forest, Yreka, CA. Retrieved from http://www.fs.usda.gov/detail/klamath/landmanagement/resourcemanagement/?cid=stelprdb5312713 on June 6, 2014.

USDA Forest Service. 2011. Soil and Water Conservation Handbook. Chapter 10 – Water Quality Management Handbook.

USFS. 2002. Wet Weather Operating Standards. Klamath National Forest, Region 5. US Forest Service.

Appendix E: Photo Journal

Photo E-1: NASA imagery on September 7, 2014, showing the smoke plume from the Happy Camp Complex fires.

Photo E-2: Example of air quality issues during the 2014 fires within the Westside Fire Recovery Project area. Residents within northern California and southern Oregon experienced continued weeks of heavy smoke accumulation and low air quality during the 2014 fire

Photo E-3: A smoke column generated by high intensity fire on the Happy Camp Complex. Pre-fire heavy fuel loading conditions contributed to the stand-replacing nature of the fire and its large smoke column. The smoke column carried burning embers aloft, spotting fires ¼ to ½ mile downwind of the fire and accelerating fire spread.

Photo E-4: A fuel break constructed within the Happy Camp Fire, which was used by firefighters for fire suppression. This is an example of moderate to high intensity fire that resulted in nearly total stand mortality. Photo taken on September 4, 2014.

Photo E-5 Low to moderate intensity surface fire activity occurred when the weather conditions and terrain created air inversion layers, which trapped smoke above the fire and reduced fire behavior. Air inversions have reduced fire behavior because of decreased solar radiation, decreased temperatures, and increased fuel moisture at the ground surface. Air inversions were most frequent in the mornings and early afternoons.

Photo E-6: An illustration of fire activity after the air inversion lifted, resulting in extreme fire behaviors. Moderate to high severity fires (>50% tree mortality) occurred within 33% of the project area.

Photo E-7: Example of a mixed severity area within the Westside Fire Recovery project. Along the bottom of the photo, low severity burns can be seen, along with moderate severity in the middle of the photo and high severity along the hillside ridgeline.

Photo E-8: Photo of a large high severity patch within the East Fork of the Walker Creek drainage. Areas like these are proposed for salvage harvest within the Westside Fire Recovery project.

Photo E-9: A high severity burned area above the Scott River Road near Scott Bar, California. Although fire-killed trees still bear needles immediately following the fire, most trees within high severity burn areas are expected to die. Insects (primarily beetles), stain and decay fungi, and weather all act as deterioration agents in fire-killed timber.

Photo E-10: Example of 100% mortality of trees within the Beaver Fire area. Note the lack of groundcover and burned out stumps, which is an indication of a high intensity burned area.

Photo E-11: A high severity burned area within the Beaver Fire area. Note the lack of groundcover and burned out stumps, which is an indication of a high intensity burned area.

Photo E-12: An area of high severity burn within the Westside Fire Recovery project with Tanners Peak in the background. Tanners peak is within an Inventoried Roadless Area where no salvage harvest is proposed.

Photo E-13: Example of a mixed severity patch. Areas within patches that experienced high severity burns are proposed for salvage harvest under alternative 2 of the Westside Fire Recovery project.

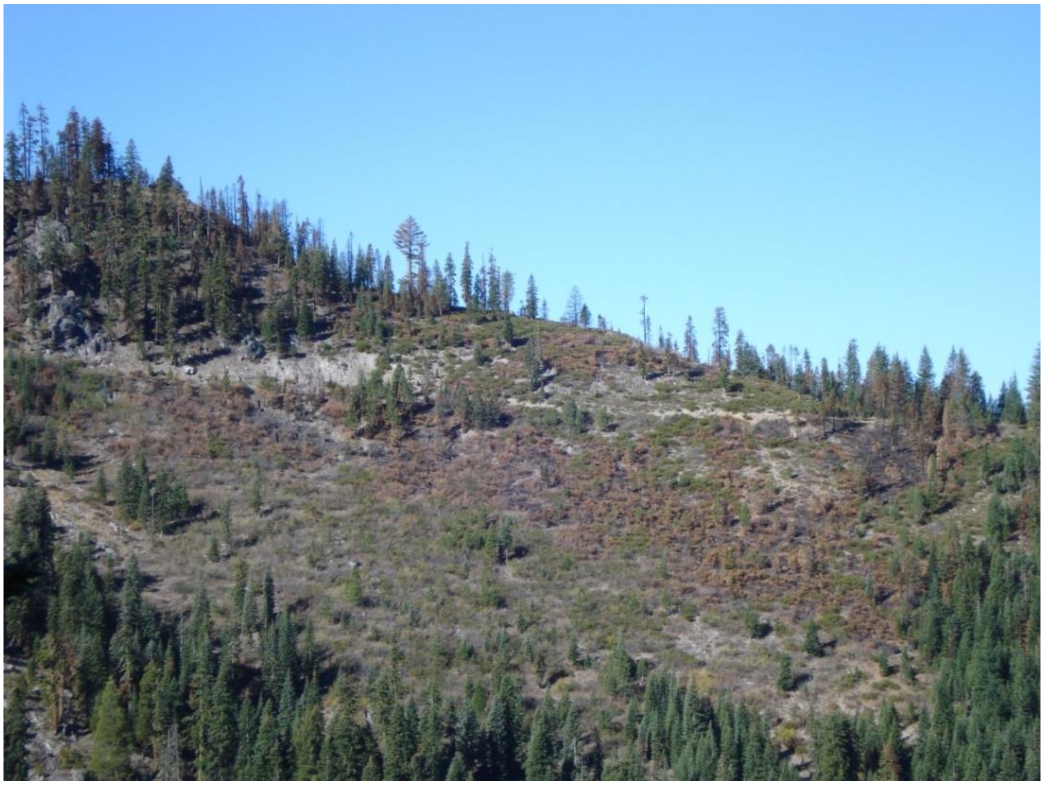

Photo E-14: A plantation that experienced low severity burns and has been excluded from site preparation and reforestation due to the presence of green seed trees, its upper slope position, and the existing vegetation.

Photo E-15: Stand that burned at high severity and is proposed for fuels treatment in order to reduce standing fuels and to promote oak regeneration.

Photo E-16: High severity fire effects on the Happy Camp Complex. The fire consumed duff and needle cast, small branches, and large downed woody material, resulting in low surface fuel loading in the existing condition. Within the canopy, full consumption of leaf and needle foliage occurred, leaving standing dead trees and barren soils. As snags continue to decay, break, and fall, surface fuel loading and the severity and intensity of future fires will increase. Increased fire intensities and fallen snags will inhibit the effective control of future fires and/or put fire suppression crews at increased risk.

Photo E-17: Canopy view of a high fire severity patch within the Whites Fire. Most of the needles are gone.

Photo E-18: Moderate to high severity fire areas within surface and mid-story canopy fuels. Surface fuel loadings were primarily fully consumed during the fires. Pockets of larger downed fuels remain visible on the surface.

Photo E-19: Moderate to high severity fire within canopy fuels. The crown fuel profile varies with some trees being consumed by the fire and other trees retaining needles in the tree canopy.

Photo E-20: A typical area where roadside hazard treatment is proposed with the Westside Fire Recovery project (chapter 2). Patches of green trees can be seen along with patches of trees that experienced high burn severity.

Photo E-21: A roadway that experienced high burn severity during the 2014 fires. Areas such as this will receive roadside hazard treatment under the action alternatives of the Westside Fire Recovery project (see chapter 2).

Photo E-22: Example of an area that would be treated using salvage harvest and preparation and planting, above and below the roadway.

Photo E-23: An example of a fallen fire-killed tree along a roadway, affecting the safety and access of forest workers and the public.

Photo E-24: Example of an area that would receive site preparation and planting under alternative 2 of the Westside Fire Recovery project. High severity burns can be seen in the foreground of the photo.

Photo E-25: Example of a high severity burned area in the foreground with mixed severity in the background.

Photo E-26: A mixed severity area in the background with a high severity area in the foreground with little to no ground cover. The high severity area is an example of the type of area proposed for treatment.

Photo E-27: Stand with a mixture of hardwood components and remnant large tree stumps. The area on the east facing aspect on a middle one-third slope is proposed for hand-cutting, piling and burning, and planting.

Photo E-28: Unit within the Beaver Fire area proposed for site preparation using mastication and planting. Mastication was chosen due to favorable machine access, gentle slope percent, the diameter of material on site, and the low levels of existing ground fuel.

Photo E-29: An example of an untreated area in 2012, ten years after the 2002 Stanza Fire, which was located adjacent to the Happy Camp Complex on the Klamath National Forest. Note the volume of standing and felled snags intermixed with brush. Without treatment (alternative 1), areas within the Westside Fire Recovery project can be expected to have similar fuels loading conditions ten years from now, increasing their susceptibility to high severity fire.

Photo E-30: Firefighters survey multiple burning snags and employ tactics to safely build line to control the fire. The weakened trees pose a risk to firefighters, both from falling and producing spot fires ahead of the main fire. Without treatment within the Westside Fire Recovery project area, it will be difficult to suppress large fires in the future.

Photo E-31: Photos displaying a pre-and-post fire condition from the 2012 Chips Fire on the Plumas and Lassen National Forests in northern California. These photos highlight the reburn potential within a 12 year old fire scar of the 2000 Storrie Fire. Shrub regrowth among standing snags created high severity fire effects within the footprint of the 2000 Storrie Fire. Heavy consumption of shrub, herb, grass, snag and downed fuels is evident. The Chips Fire, also subjected to daily thermal inversions like the 2014 fires in this project, started and burned for a long period of time within steep drainages of the Feather River Canyon.

Photo E-32: Salvage and site preparation activities on the Klamath National Forest Salmon Salvage project, adjacent to the Whites Fire. Trees are cut and removed from the site, with follow-up hand piling to meet surface fuel loading criteria sufficient for low intensity fire. Similar activities are proposed in the Westside Fire Recovery project (chapter 2).

Photo E-33: A masticated fuel bed. Brush and small trees have been mulched to reduce surface fuel bed depth to less than two inches.

Photo E-34: Without action, fire-killed trees will fall over time in “jack-strawed” patterns, increasing fuel bed height above the ground surface. Higher surface fuel beds are subject to wind and preheating of fuels lower in the surface fuel profile, increasing fire behavior potential. Under alternative 2 of the Westside Fire Recovery project, where mastication is identified as a treatment option, chipped material will create a compact fuel bed. Masticated material would also decay faster due to its proximity to the ground and increased fuel moisture conditions. Under the action alternatives, fire-killed trees will be removed before they fall and become “jack-strawed,” improving fuel conditions as well as foot travel and safety conditions for forest workers and firefighters during suppression efforts.

Photo E-35: Walker Creek in the Happy Camp Complex area. While significant portions of the watershed burned at moderate and high severity in 2014 (as can be seen in the photo), the main stem valley bottom was left mostly unburned.

Photo E-36: An example of an existing legacy site within the project area where erosion has been an issue. The treatment of this legacy site is proposed for this project in all action alternatives. If this legacy site is not treated, then future erosion and subsequent negative impacts to watershed conditions are likely.

Appendix F: Treatment by Prescription by Project Area and Alternative

Table F-1: Treatment by Prescription within the Beaver Project Area by Alternative

Treatment by Prescription (Beaver Project Area)				
Fuels Treatment by Prescription	**Alternative 2**	**Alternative 3**	**Alternative 4**	**Alternative 5**
Fuels				
Fuels Management Zone				
Establish/Maintain Fuel Break w/ Mechanical or Hand Thin, Pile, & Burn	428	428	428	428
Hand Thin, Pile, Burn or Chip or Leave for Firewood	135	135	135	456
Machine Pile & Burn				206
Mastication or other Mechanical Thin	219	219	219	219
Ridgetop	84	84	84	84
Roadside				146
Underburn				540
Fuels Management Zone Total Acres	**866**	**866**	**866**	**2,078**
Roadside				
Roadside	612	612	612	612
Roadside Total Acres	**612**	**612**	**612**	**612**
Understory Prescribed Fire				
Underburn				
Understory Thin, Pile, Burn or Chip				
Understory Prescribed Fire Total Acres				
WUI				
Establish/Maintain Fuel Break w/ Mechanical or Hand Thin, Pile, & Burn	10	10	10	10
Hand Thin, Pile, Burn or Chip or Leave for Firewood	108	108	108	108
Machine Pile & Burn				
Mastication or other Mechanical Thin	415	415	415	415
Roadside	47	47	47	47
Underburn	33	33	33	33
Understory Thin, Pile, Burn or Chip				
WUI Total Acres	**613**	**613**	**613**	**613**
Total Fuels Acres	**2,091**	**2,091**	**2,091**	**3,304**
Salvage Harvest by System	**Alternative 2**	**Alternative 3**	**Alternative 4**	**Alternative 5**
Ground Based	663		596	663
Helicopter				
Skyline	196		156	165
Total Acres	**859**		**752**	**828**
Site Prep and Plant	**Alternative**	**Alternative**	**Alternative**	**Alternative**

	2	3	4	5
Vegetation Management	**1,782**	**1,782**	**1,782**	
Cable yard, Plant	57	57	57	57
Fuel Treatment	111	111	111	111
Handcut and pile	188	188	188	188
Handcut and pile, Plant	102	102	102	102
Handcut and pile, Plant *IRA				
Lop & Scatter, Plant				
Masticate	76	76	76	66
Masticate and subsoil, Plant	251	251	251	251
Masticate, Plant	105	105	105	105
Mechanical thin and pile, Plant	663	663	663	663
Mechanical thin and pile, subsoil	180	180	180	180
Natural regeneration				
Plant as is	49	49	49	49
Total Site Prep and Plant Acres	**1,782**	**1,782**	**1,782**	**1,771**
Roadside Hazard Salvage	**Alternative 2**	**Alternative 3**	**Alternative 4**	**Alternative 5**
Total Roadside Hazard Salvage Acres	**3,109**	**3,109**	**2,836**	**3,109**

Table F-2: Treatment by Prescription within the Happy Camp Project Area by Alternative

Treatment by Prescription (Happy Camp Project Area)				
Fuels Treatment by Prescription	**Alternative 2**	**Alternative 3**	**Alternative 4**	**Alternative 5**
Fuels				
Fuels Management Zone				
Establish/Maintain Fuel Break w/ Mechanical or Hand Thin, Pile, & Burn	2,038	2,038	2,038	2,038
Hand Thin, Pile, Burn or Chip or Leave for Firewood	645	645	645	645
Machine Pile & Burn	252	252	252	252
Mastication or other Mechanical Thin	15	15	15	15
Ridgetop				
Roadside	73	73	73	73
Underburn				
Fuels Management Zone Total Acres	**3,024**	**3,024**	**3,024**	**3,024**
Roadside				
Roadside	3,012	3,012	3,012	3,012
Roadside Total Acres	**3,012**	**3,012**	**3,012**	**3,012**
Understory Prescribed Fire				**1,556**
Underburn	1,219	1,219	1,219	1,219
Understory Thin, Pile, Burn or Chip	337	337	337	337
Understory Prescribed Fire Total Acres	**1,556**	**1,556**	**1,556**	**1,556**
WUI				
Establish/Maintain Fuel Break w/ Mechanical or Hand Thin, Pile, & Burn	104	104	104	104
Hand Thin, Pile, Burn or Chip or Leave for Firewood	482	482	482	482
Machine Pile & Burn				

Mastication or other Mechanical Thin	19	19	19	19
Roadside	260	260	260	260
Underburn	244	244	244	244
Understory Thin, Pile, Burn or Chip	88	88	88	88
WUI Total Acres	**1,197**	**1,197**	**1,197**	**1,197**
Total Fuels Acres	**8,788**	**8,788**	**8,788**	**8,788**
Salvage Harvest by System	**Alternative 2**	**Alternative 3**	**Alternative 4**	**Alternative 5**
Ground Based	689	571	624	228
Helicopter	4,393	3,908	4,535	1,459
Skyline	4,896	4,406	3,456	822
Total Acres	**9,978**	**8,885**	**8,615**	**2,509**
Site Prep and Plant	**Alternative 2**	**Alternative 3**	**Alternative 4**	**Alternative 5**
Vegetation Management	**5,470**	**5,470**	**5,470**	
Cable yard, Plant				
Fuel Treatment				
Handcut and pile	85	85	85	
Handcut and pile, Plant	2,576	2,576	2,576	600
Handcut and pile, Plant *IRA	82	82	82	
Lop & Scatter, Plant	8	8	8	
Masticate				
Masticate and subsoil, Plant				
Masticate, Plant	55	55	55	
Mechanical thin and pile, Plant	689	689	689	198
Mechanical thin and pile, subsoil				
Natural regeneration	6	6	6	6
Plant as is	1,970	1,970	1,970	1,290
Total Site Prep and Plant Acres	**5,470**	**5,470**	**5,470**	**2,093**
Roadside Hazard Salvage	**Alternative 2**	**Alternative 3**	**Alternative 4**	**Alternative 5**
Total Roadside Hazard Salvage Acres	**14,673**	**14,673**	**14,102**	**14,673**

Table F-3: Treatment by Prescription within the Whites Project Area by Alternative

Treatment by Prescription (Whites Project Areas)				
Fuels Treatment by Prescription	**Alternative 2**	**Alternative 3**	**Alternative 4**	**Alternative 5**
Fuels				
Fuels Management Zone				
Establish/Maintain Fuel Break w/ Mechanical or Hand Thin, Pile, & Burn	648	648	648	648
Hand Thin, Pile, Burn or Chip or Leave for Firewood	268	268	268	268
Machine Pile & Burn				
Mastication or other Mechanical Thin				
Ridgetop				
Roadside				
Underburn				

Fuels Management Zone Total Acres	**917**	**917**	**917**	**917**
Roadside				
Roadside	807	807	807	807
Roadside Total Acres	**807**	**807**	**807**	**807**
Understory Prescribed Fire				**9,870**
Underburn	9,863	9,863	9,863	9,863
Understory Thin, Pile, Burn or Chip	7	7	7	7
Understory Prescribed Fire Total Acres	**9,870**	**9,870**	**9,870**	**9,870**
WUI				
Establish/Maintain Fuel Break w/ Mechanical or Hand Thin, Pile, & Burn	12	12	12	12
Hand Thin, Pile, Burn or Chip or Leave for Firewood	120	120	120	120
Machine Pile & Burn	26	26	26	26
Mastication or other Mechanical Thin				
Roadside	24	24	24	24
Underburn	198	198	198	198
Understory Thin, Pile, Burn or Chip	34	34	34	34
WUI Total Acres	**413**	**413**	**413**	**413**
Total Fuels Acres	**12,007**	**12,007**	**12,007**	**12,007**
Salvage Harvest by System	**Alternative 2**	**Alternative 3**	**Alternative 4**	**Alternative 5**
Ground Based	41	41	41	15
Helicopter	542	423	542	57
Skyline	279	232	270	
Total Acres	**862**	**696**	**853**	**72**
Site Prep and Plant	**Alternative 2**	**Alternative 3**	**Alternative 4**	**Alternative 5**
Vegetation Management	**654**	**654**	**654**	
Cable yard, Plant				
Fuel Treatment				
Handcut and pile	62	62	62	
Handcut and pile, Plant	517	517	517	
Handcut and pile, Plant *IRA				
Lop & Scatter, Plant				
Masticate				
Masticate and subsoil, Plant				
Masticate, Plant	9	9	9	
Mechanical thin and pile, Plant	41	41	41	
Mechanical thin and pile, subsoil				
Natural regeneration				
Plant as is	26	26	26	
Total Site Prep and Plant Acres	**654**	**654**	**654**	
Roadside Hazard Salvage	**Alternative 2**	**Alternative 3**	**Alternative 4**	**Alternative 5**
Total Roadside Hazard Salvage Acres	**2,717**	**2,717**	**2,645**	**2,717**

Table F-4: Treatment by Prescription within the Total of all Project Areas by Alternative

Treatment by Prescription (Total For All Project Areas)				
Fuels Treatment by Prescription	**Alternative 2**	**Alternative 3**	**Alternative 4**	**Alternative 5**
Fuels				
Fuels Management Zone				
Establish/Maintain Fuel Break w/ Mechanical or Hand Thin, Pile, & Burn	3,114	3,114	3,114	3,114
Hand Thin, Pile, Burn or Chip or Leave for Firewood	1,049	1,049	1,049	1,370
Machine Pile & Burn	252	252	252	458
Mastication or other Mechanical Thin	234	234	234	234
Ridgetop	84	84	84	84
Roadside	73	73	73	218
Underburn				540
Fuels Management Zone Total Acres	**4,806**	**4,806**	**4,806**	**6,019**
Roadside				
Roadside	4,431	4,431	4,431	4,431
Roadside Total Acres	**4,431**	**4,431**	**4,431**	**4,431**
Understory Prescribed Fire				**11,426**
Underburn	11,082	11,082	11,082	11,082
Understory Thin, Pile, Burn or Chip	344	344	344	344
Understory Prescribed Fire Total Acres	**11,426**	**11,426**	**11,426**	**11,426**
WUI				
Establish/Maintain Fuel Break w/ Mechanical or Hand Thin, Pile, & Burn	126	126	126	126
Hand Thin, Pile, Burn or Chip or Leave for Firewood	710	710	710	710
Machine Pile & Burn	26	26	26	26
Mastication or other Mechanical Thin	434	434	434	434
Roadside	331	331	331	331
Underburn	475	475	475	475
Understory Thin, Pile, Burn or Chip	122	122	122	122
WUI Total Acres	**2,223**	**2,223**	**2,223**	**2,223**
Total Fuels Acres	**22,886**	**22,886**	**22,886**	**24,099**
Salvage Harvest by System	**Alternative 2**	**Alternative 3**	**Alternative 4**	**Alternative 5**
Ground Based	1,394	612	1,261	906
Helicopter	4,934	4,331	5,077	1,516
Skyline	5,371	4,638	3,882	987
Total Acres	**11,699**	**9,581**	**10,221**	**3,409**
Site Prep and Plant Treatments by Prescription	**Alternative 2**	**Alternative 3**	**Alternative 4**	**Alternative 5**
Vegetation Management	**654**	**654**	**654**	
Cable yard, Plant	**7,907**	**7,907**	**7,907**	
Fuel Treatment	57	57	57	57
Handcut and pile	111	111	111	111
Handcut and pile, Plant	335	335	335	188
Handcut and pile, Plant *IRA	3,194	3,194	3,194	701
Lop & Scatter, Plant	82	82	82	

Masticate	8	8	8	
Masticate and subsoil, Plant	76	76	76	66
Masticate, Plant	251	251	251	251
Mechanical thin and pile, Plant	169	169	169	105
Mechanical thin and pile, subsoil	1,393	1,393	1,393	861
Natural regeneration	180	180	180	180
Plant as is	6	6	6	6
Total Site Prep and Plant Acres	2,045	2,045	2,045	1,339
Roadside Hazard Salvage	**Alternative 2**	**Alternative 3**	**Alternative 4**	**Alternative 5**
Total Roadside Hazard Salvage Acres	**20,499**	**20,499**	**19,584**	**20,499**

the assertion that salvage harvest as proposed in the existing alternatives of the Westside Recovery project is in the best interest of our communities for safety reasons or otherwise. We support salvage harvest along strategic ridges, and adjacent to communities with the idea fire-fighter safety in mind, particularly in order to implement underburn treatments and to protect communities in managed fire scenarios. This alternative allows for roadside hazard treatments along class 3, 4 and 5 roads that are well-traveled and serve as important access/egress routes, and those class 1 and 2 roads that are needed for strategic fuels reduction projects to be used in the reintroduction of fire on the landscape. You may notice that there are no site prep and plant units displayed on these maps. This is consistent with the comments we provided during scoping asserting that wide-scale planting of conifer species is unwarranted and contrary to our management vision. Additionally we added several fuels units to this alternative. Some of these are linear treatments for the protection of private property, some are additional ridge top treatments for the reintroduction of landscape-scale fire, and others are large underburn treatment units to allow for managing wildfire for resource benefits where it poses little threat to communities.

We officially request that this Karuk Alternative be included in the draft EIS of the Westside Recovery Project. We feel the community should have the opportunity to review and comment on an alternative that reflects Karuk Tribal values. Earl Crosby has been designated by Tribal Council to be the initial point of contact for this project. If you have any questions or would like to discuss this alternative in further detail, please contact him at 530-469-3454 or ecrosby@karuk.us to continue Government to Government Consultation. We fully expect that the consultation that was initiated on February 19, 2015 will continue through the life of this project.

Yootva,

Robert Super

Karuk Tribe

Vice Chairman

Cc: Randy Moore, Regional Forester

Robert Goodwin, Regional Tribal Program Manager

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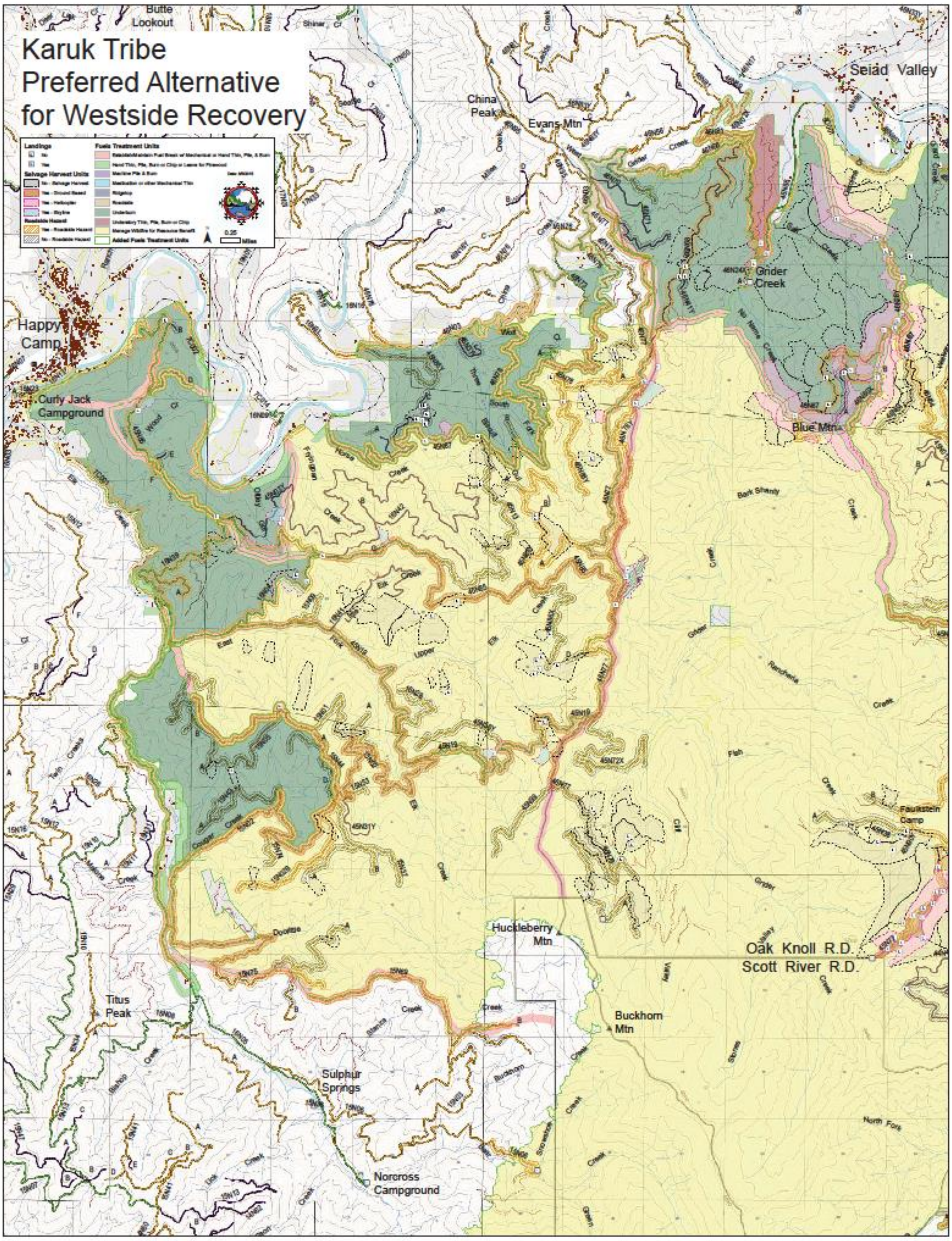
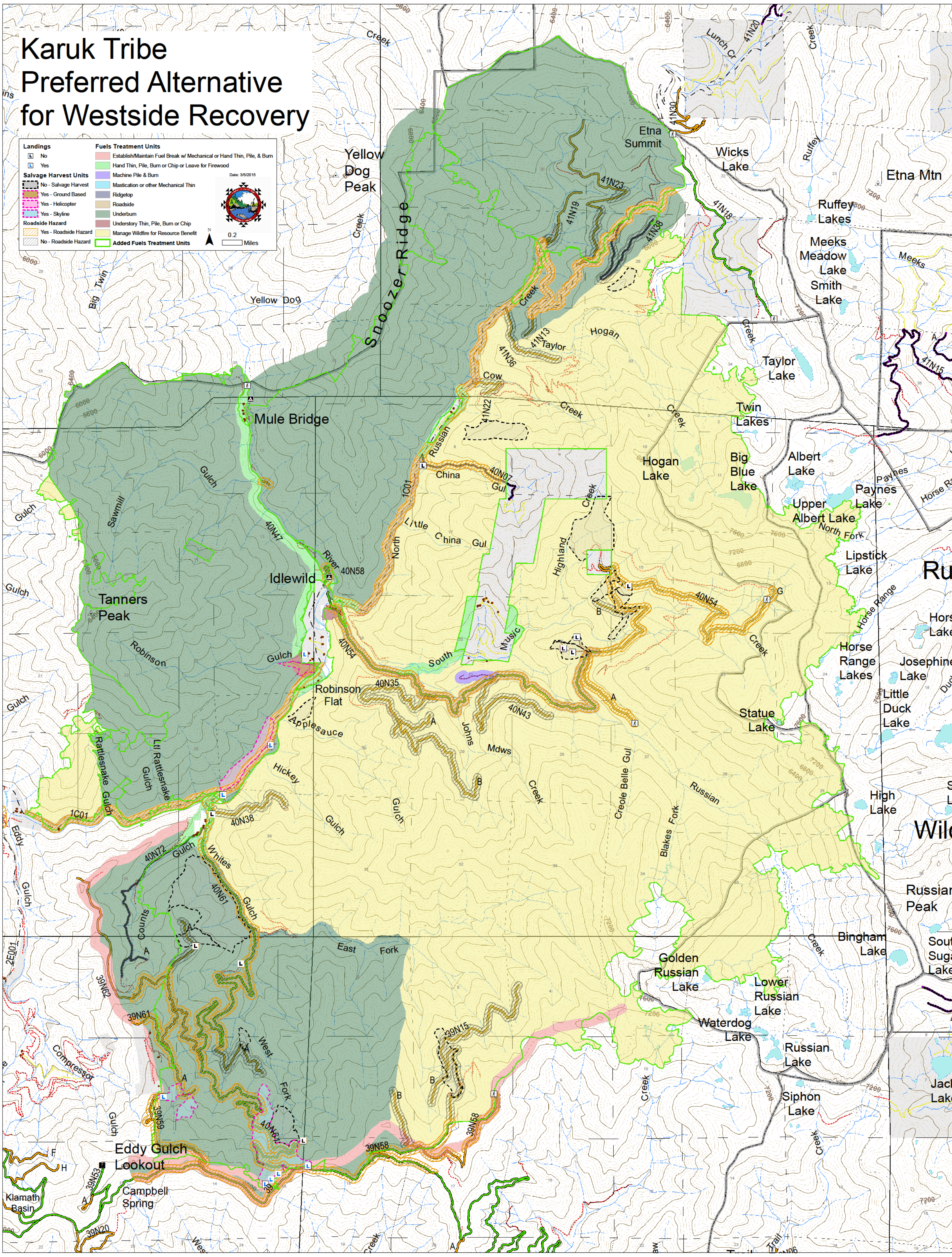

Karuk Tribe
Preferred Alternative
for Westside Recovery
Butte Lookout
Seiad Valley
China Peak
Evans Mtn
Grider Creek
Happy Camp
Curly Jack Campground
Blue Mtn
Huckleberry Mtn
Oak Knoll R.D.
Scott River R.D.
Titus Peak
Buckhorn Mtn
Sulphur Springs
Norcross Campground


Karuk Tribe
Preferred Alternative
for Westside Recovery
Seiad Valley
Slinkard Peak
Grider Creek
O'Neil Creek
Blue Mtn.
Sarah Totten
Blue Heron
Hamburg
Browns Knob
Lake Mtn Lookout
Tom Martin Peak
Scott Bar Ponds
Scott Bar
Faulkstein Camp
Tyler Mdws
Oak Knoll R.D.
Scott River R.D.
Anderson Peak
Scott Bar Mountain Lookout
Bridge Flat
Kelsey Creek
Spring Flat
Jones Beach
Indian Scotty


Karuk Tribe
Preferred Alternative
for Westside Recovery
Landings
No
Yes
Salvage Harvest Units
No - Salvage Harvest
Yes - Ground Based
Yes - Helicopter
Yes - Skyline
Roadside Hazard
Yes - Roadside Hazard
No - Roadside Hazard
Fuels Treatment Units
Establish/Maintain Fuel Break w/ Mechanical or Hand Thin, Pile, & Burn
Hand Thin, Pile, Burn or Chip or Leave for Firewood
Machine Pile & Burn
Mastication or other Mechanical Thin
Ridgetop
Roadside
Underburn
Understory Thin, Pile, Burn or Chip
Manage Wildfire for Resource Benefit
Added Fuels Treatment Units
Date: 3/5/2015
N
0.2
Miles
Yellow Dog Peak
Snoozer Ridge
Etna Summit
Wicks Lake
Etna Mtn
Ruffey Lakes
Meeks Meadow Lake
Smith Lake
Taylor Lake
Twin Lakes
Mule Bridge
Hogan Lake
Big Blue Lake
Albert Lake
Paynes Lake
Upper Albert Lake
Lipstick Lake
Idlewild
Tanners Peak
Horse Lake
Horse Range Lakes
Josephine Lake
Little Duck Lake
Robinson Flat
Statue Lake
High Lake
Russian Peak
Bingham Lake
Golden Russian Lake
Lower Russian Lake
Waterdog Lake
South Sugar Lake
Russian Lake
Jacks Lake
Siphon Lake
Eddy Gulch Lookout
Campbell Spring
Klamath Basin